JUNE
1960

FOUNDRY

A PENTON PUBLICATION

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FIVE-DEEP

Millions have been made and saved

with UCM's "FIVE-DEEP" Ferroalloys

Metal producers in their ceaseless drive to improve products and profits are learning the value of Union Carbide Metals' FIVE-DEEP ferroalloys. Here are some of the advantages these alloys provide.

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1. **Technology**—many million dollars a year, invested in UCM's 600-man research and development center—helps you produce more profitable metals. The payoff has been progress—over 100 new alloys and metals—providing countless ways to improve your products.
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3. **Global Ore Sources** assure you uninterrupted supplies of ferroalloys. UCM's close association with many mines throughout the world provides dependable raw material sources.
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5. **Strictest Quality Control**—with over 100,000 tests per month from mines to shipment—makes sure you always get alloys of uniform size and analysis, with minimum fines, lot after lot.

For better metals, production economies, bigger profits, insist on UCM's FIVE-DEEP alloys. Union Carbide Metals Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y., producer of "Electromet" brand metallurgical products.

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UNION CARBIDE METALS

Only **ELECTROMET** ferroalloys from **UCM** are so deep in extra values to help you.

Circle 551 on Page 53

"F" Nickel shot gives gray iron castings the extra life your customers want

When you add Inco "F"* Nickel shot to a ladle of molten gray iron, you greatly improve your control over the metal structure and add appreciably to the service life of the castings.

For example, you can boost tensile and compressive strengths, rigidity, and the response of the part to heat treatment. "F" Nickel increases the resistance of the castings to wear, to mechanical and thermal shock, to high temperatures. It promotes development of a uniform density across thick and thin sections. It even improves the chill control in castings.

As you will quickly recognize, many of these effects do more than add a service-life extra. They also help you overcome many of the factors that make for rejects and increase your costs.

How can "F" Nickel control so many factors?

"F" Nickel was specially developed by Inco for ladle addition to gray iron. It provides Nickel (92%) and silicon (5.5%) in a desirable balance and in forms that go into solution in the melt at a low 2300°F. Nickel works together with the carbon to help you establish desirable pearlitic matrices with excellent dispersion of properly sized graphite flakes.

For easy ladle addition, Inco's distributors supply Inco "F" Nickel shot in 500-pound drums.

For more information on the improvement of gray iron with Inco "F" Nickel, write for our useful, 32-page booklet, "Engineering Properties and Applications of NICKEL CAST IRONS."

*Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO NICKEL

NICKEL MAKES CASTINGS PERFORM BETTER LONGER

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...Fluid Power news

REPORT NO. 11,802 AUTOMATIC METALS BRIQUETTING PRESSES

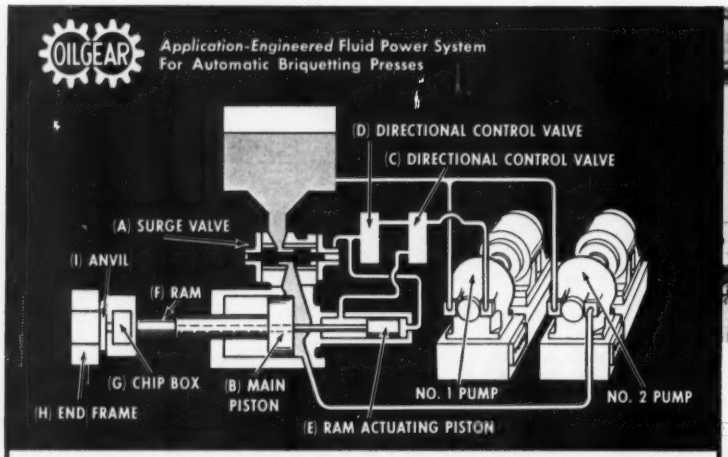
From Oilgear *Application-Engineering* Files

HOW OILGEAR-EQUIPPED BRIQUETTING PRESSES PRODUCE MORE—LONGER—AUTOMATICALLY

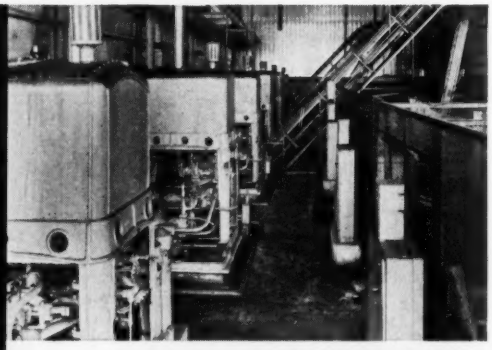
CUSTOMER: *Milwaukee Foundry Equipment Division of SPO Inc.*

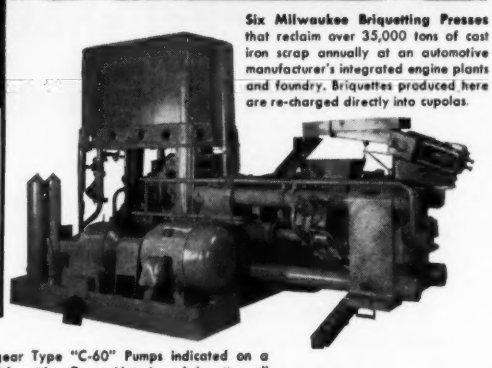
DATA: To power a line of presses specially designed for low cost, rapid conversion of bulky, low-grade metal turnings and borings into dense, uniform-sized briquettes to: conserve storage space; simplify handling; prevent storage oxidation—particularly with finely divided metals or sponge iron; provide sufficient density and size to melt rather than flash into oxide on entry into foundry cupola; control metal content; provide a simple means of accurate compounding for alloying or supplying a flux.

PRESS SYSTEM REQUIREMENTS: 1. Eliminate wear and maintenance costs resulting from use of gears and bearings. 2. To be controlled hydraulically, electrically, or electrohydraulically for automatic cycling at rates ranging from 9 to 17 strokes per minute. 3. Sufficient force to provide briquette densities of 70 to 80% with conservative pump loading. 4. Long life, rugged dependability . . . capable of years of continuous operation with an absolute minimum of maintenance.



HOW IT WORKS: Oilgear Pump No. 1 is the main operating pump. Oilgear Pump No. 2 supplements fluid for a high-speed compression stroke. Cycle starts with fluid from No. 1 Pump through Oilgear Directional Control Valves (C, D) to Ram Actuating Piston (E), moving Ram (F) forward in Chip Box (G) at high speed and transferring loose material into the die. Surge Valve (A) is open to provide gravity flow of fluid from Reservoir (H) to Main Cylinder (B). When a preset pressure is reached, Surge Valve (A) closes, and fluid from Pump No. 1 is delivered to both Ram Actuating Piston (E) and Main Piston (B) with output of Pump No. 2 added for final compression stroke. When maximum preset briquetting pressure is reached, Valve (D) automatically directs fluid to a stripping piston, removing die held in Chip Box (G) from formed briquette. Chip Box movement trips a switch causing Valve (C) to direct fluid to open Surge Valve (A) and retract Ram Actuating Piston (E) and Ram (F) at high speed. Finished briquette drops out and a new cycle is automatically started. Processing cast iron borings on the two-pump press is completed in 5 or 6 seconds—10 to 12 cycles per minute, to produce up to 700 ten-pound briquettes—better than 3 tons of ideal cupola scrap every hour. These two-pump-system presses have over 40% more output than an identical press with a single pump.





Six Milwaukee Briquetting Presses that reclaim over 35,000 tons of cast iron scrap annually at an automotive manufacturer's integrated engine plants and foundry. Briquettes produced here are re-charged directly into cupolas.

One of the two Oilgear Type "C-60" Pumps indicated on a 350-ton **Milwaukee Briquetting Press.** Note how briquettes roll out of the press to be picked up by magnets.

SOLUTION: Oilgear *Application-Engineered* systems consisting of Oilgear Type "C" Heavy-Duty Constant Displacement Radial Rolling Piston Pumps and Directional Control Valves. Pump requirements range from 23 gpm on the 75-ton Presses to 325 gpm on new 1000-ton presses. *Milwaukee Foundry Equipment*—builder of over 80% of all briquetting presses, and an exclusive user of Oilgear Fluid Power Systems since 1927—recently reported: "*We just modernized a press that had been in continuous cast iron briquetting operation for over 18 years . . . there had been no reported major maintenance . . . the Oilgear components still operated fine—with no appreciable signs of wear or loss in efficiency.*"

This is just one evidence—out of hundreds—of the long service life of Oilgear Systems. Ten or more years of continuous service is common with Oilgear equipment, rather than the exception . . . with many of these systems operating under adverse conditions—rapid cycling, grit-laden air, heat, and extreme humidity. Where the going is toughest—Oilgear Pumps just keep rolling along . . . quietly, efficiently.

Circle 555 on Page 53

With Oilgear Heavy-Duty System Components designed for thousands of hours of continuous service at full rated load, savings are compounded with every hour of uninterrupted performance. That's why machinery and equipment manufacturers and *their* customers say . . .

"for the lowest cost per year . . . it's Oilgear!"

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June 1960
Volume 88—Number 6

FOUNDRY
A PENTON PUBLICATION

This cast iron pipe was produced at the country's newest pipe foundry—the Council Bluffs, Iowa, plant of Griffin Pipe Div., Griffin Wheel Co. Formerly used to make chilled iron car wheels, the plant now casts pipe in diameters of 4 to 12 in. See Page 100.

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Editorial—By WILLIAM G. GUDE

Pipe Plant Meets Need of Changing Market . 100

Centrifugally cast iron pipe is being produced in a plant previously used to cast railroad car wheels. This article discusses reasons for the change and describes the new plant operation—By ROBERT H. HERRMANN

Core Production with Air-Setting Sand 106

Cores made from air-setting sand mixes range in weight from 30 to 1800 lb and are manufactured on a routine basis on a series of integrated roller lines in two separate corerooms. Many benefits have been realized

Die Design Improves Zinc Diecastings 109

Here's a discussion of zinc diecastings in relation to features of die designs planned to produce optimum quality. It includes a resume of the composition limits in zinc alloys—By GEORGE L. WERLEY

Producing High-Strength Gray Iron 116

Gray iron foundrymen will find much of interest in this concise treatment of inoculation. It covers purposes of the process, types of inoculants available, and their successful use—By HOWARD H. WILDER

Punched Card Data Improve Casting Quailty 120

Use of data processing machines provides foundrymen with another tool to improve the effectiveness of casting production. One plant has reduced defective castings nearly 50 per cent—By ROBERT H. HERRMANN

Gating Steel Castings 124

This article is the ninth in our series on gating and risering and the first of two on gating of steel castings. These two articles point out the importance of the down gate and the distribution system—By CHARLES W. BRIGGS

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A prophecy factor is needed when we try to figure the costs of a prospective job which has little in common with jobs done before—By RALPH L. LEE

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To provide foundry technicians, Michigan foundrymen and Western Michigan University developed a two-year training program—By Dr. J. W. GIACHINO

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Mobile sand conditioning, handling, and reclaiming plant, self-contained in a 37-ft trailer, will make year-long, coast-to-coast tour

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FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions. Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified for under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2. Published monthly by The Penton Publishing Co., Penton Building, Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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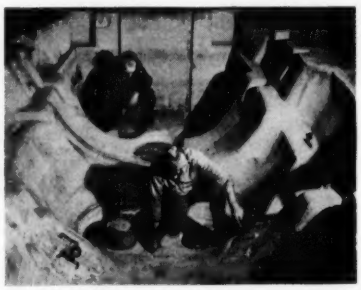
THE EDITORS' WORKSHOP

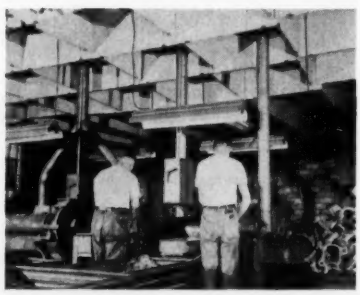
LARGE CASTINGS: General Electric Co.'s new iron and steel foundry in Schenectady, N. Y., specializes in production of castings weighing



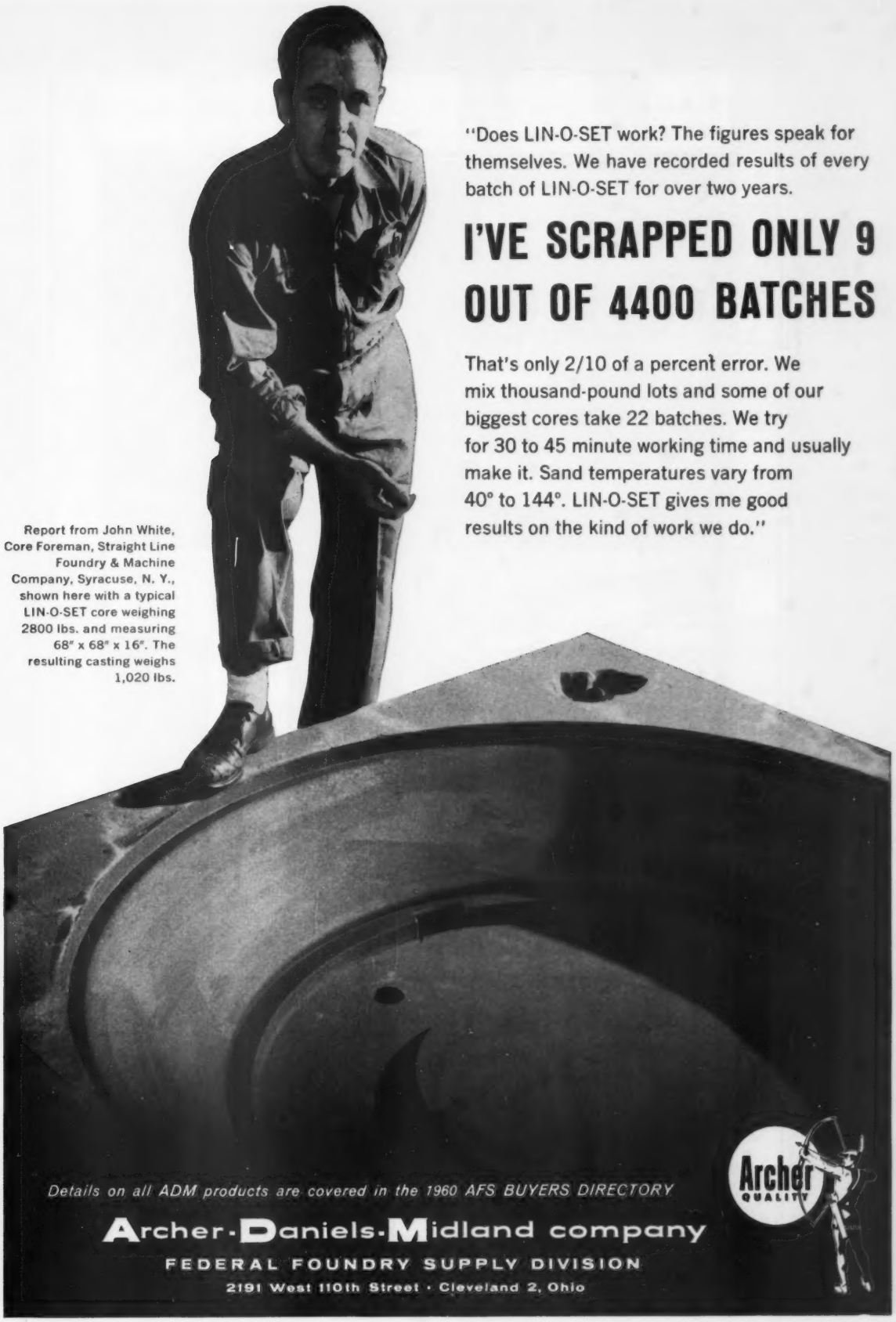
up to 50 tons. Major output to date has been cast steel shells for steam turbines. Molders are shown here finishing a mold for a large turbine-generator casting. An article describing the foundry's operations will be presented in the July issue.

NEW ENGINE: Although U. S. development work in aluminum castings for automotive engines has been concerned to a large extent with metal molds, the new Rolls-Royce V-8 engine uses sand cast parts. Look for details on the casting practices in an early issue.

NOISE: The cleaning room always has posed a problem in attempts to reduce the foundry noise level. Allis-Chalmers has given this subject



considerable study, and one of the remedies it applied at its LaCrosse Works was installation of the ceiling sound absorbers shown here. Other measures adopted also will be described next month.



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Report from John White, Core Foreman, Straight Line Foundry & Machine Company, Syracuse, N. Y., shown here with a typical LIN-O-SET core weighing 2800 lbs. and measuring 68" x 68" x 16". The resulting casting weighs 1,020 lbs.

Details on all ADM products are covered in the 1960 AFS BUYERS DIRECTORY

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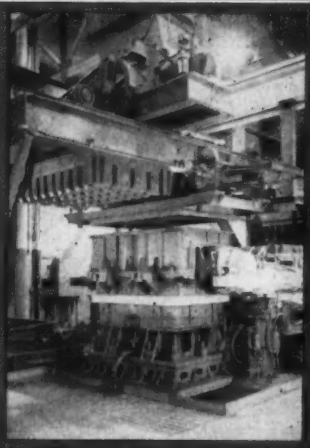

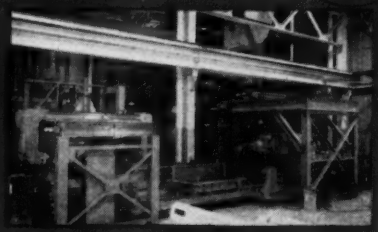

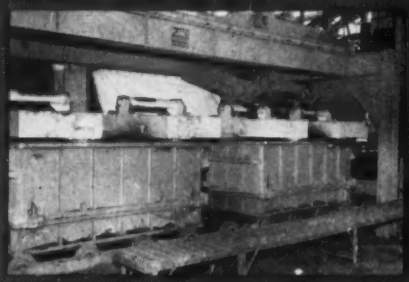

11 DRAG RETURN
2 DRAG MOLDING
At right is the drag molding machine loading station (see Fig. 1). At left is the closing station (see Fig. 4).
1 DRAG MACHINE LOADER
1 CORE SETTING
13 DRAG SHAKEOUT
4 CLOSING
5 POURING
11 COPE MOLDING
3 WEIGHT REMOVAL
12 CASTING REMOVAL
9 STRIPPING
10 WATER SPRAY
9 COPE SHAKEOUT
7 COOLING

You saw it on TV at the Foundry Show...

NEW AUTOMATIC MOLD HANDLING SYSTEM PRODUCES SEVENTY-TWO 14,000-LB. MOLDS PER HOUR

...another example of Planet Versatility

The new automatic bathtub mold handling system shown in the diagram is one of the *largest and most advanced systems in existence.* The system has a capacity to turn out seventy-two 14,000-pound molds (includes flasks, sand and casting) per hour and requires only seven operators.

Engineered and fabricated by Planet Corporation and installed in Universal/Rundle Corporation's Camden, New Jersey, foundry, this new automatic bathtub mold handling system has achieved several "firsts." They are:

- *First to be completely shuttle-indexed.*
- *First to incorporate automatic sand metering.*
- *First to use weights rather than clamps.*
- *First to index flasks through shakeout.*

Custom designed systems such as this have helped build Planet Corporation's reputation throughout industry as a *versatile* organization . . . as an organization with solutions to the most perplexing materials handling and automation problems. Let Planet demonstrate how "PV" — *Planet Versatility* — can help you solve your problems . . . you'll find *it pays to plan with Planet.*

STEP-BY-STEP DESCRIPTION OF OPERATION

The mold handling system is a complete shuttle-type indexing system which operates on a 45-second cycle. The conveyors are of the flanged-wheel type with pre-lubricated sealed ball bearings which require a minimum of maintenance. The conveyors are arranged in a rectangle encompassing the molding equipment. Each flask is propelled (pushed or pulled) individually on the conveyors by combination shuttle and lock-bar hydraulically powered mechanisms. Basically, the mechanisms are long-stroke cylinders with rotating arms equipped with a varying number of dogs which enable one hydraulic cylinder to index several flasks at the same time. The 44 x 72 x 33-inch steel flasks are held in register by the dogs. The mechanisms, which are completely synchronized, are actuated by electric limit switches. Flasks indexing requires seven seconds.

The shuttle-indexing system used to propel the flasks, plus the rectangle arrangement of the conveyors, minimizes flask requirements; the flasks are in continuous use as they are indexed around the system.

Fig. 1 — The molding cycle starts at the Herman drag "Stationmaster," an index type molding machine, and turret, a transfer and rollover device. With its crab-claw-like mechanism, the turret clamps onto an empty drag flask which has been raised approximately three feet above the conveyor level. It then raises a few inches, turns 180-degrees in a horizontal arc and simultaneously rolls the flask over and places it, bottom up, on the jolting table. The drag flask is now in position for filling.

Fig. 2 — The sand is supplied by a hopper located above the molding machine to an automatic metering box specially designed by Planet to uniformally distribute the sand to the flask. The metering box insures a minimum of surplus sand as well as even distribution. As soon as the flask is filled, the metering box is shuttled off the flask and heavy ramming back-up weights are lowered into position for the jolt cycle. Following jolting, the peening weights raise and shuttle out of position. The drag molding machine turret lifts the flask from the jolt table and again turns 180 degrees, rolls the flask over and places it on the hydraulic lift to be lowered onto the flanged-wheel conveyor.

Fig. 3 — The drag flask is then shuttle-indexed to the core setting station.

Fig. 4 — After core setting (the first of three manual operations), the drag flask is indexed to the closing station. Here the drag flask is raised via hydraulic lift to meet the cope flask which is suspended over the conveyor by a crab-release cope setter. Upon engaging, the closed mold is lowered to conveyor level, then moved to the pouring station.

Fig. 5 — Before pouring, the Planet "Weight-Shifter," an automatic weight transfer device which eliminates the need for hand clamping, gently places a 4,000-pound weight on each end of the mold. As soon as the weights have been deposited on the mold, the Whiting automatic tilt-ladle pours approximately 350-pounds of molten cast iron into the mold.

Fig. 6 — Following pouring, the mold is indexed to the next station where the "Weight-Shifter" removes the weights. It is interesting to note that the "Weight-Shifter" requires only four weights to sustain its automatic operation.

Fig. 7 — The poured mold is then shuttle-indexed along the cooling line.

Fig. 8 — The mold remains on the cooling conveyors until it reaches the stripping station. Prior to reaching the stripping station, however, a worker pulls out the sprue. (This is the second manual operation.) When the mold is shuttle-indexed to the stripper, a crab type mechanism lowers to clamp onto the cope flask.

Fig. 9 — As the stripper engages the cope flask, it automatically lifts it off the drag flask and indexes it through the cope shakeout which is enclosed for dust collecting.

Fig. 10 — Following shakeout, the cope flask is cleansed by a water spray, then indexed to the cope molding station.

Fig. 11 — The cope molding operation is the same as the drag molding operation except heavy ramming back-up weights are not used.

Fig. 12 — After the cope flask has been stripped off the drag flask, the drag flask is indexed to the next position where the tub is pulled out by a worker using an overhead hoist. (This is the last hand operation.) The hoist is conveniently centered over an overhead trolley conveyor on which the casting is hooked and transported into the cooling house.

Fig. 13 — Following this operation the drag flask is automatically indexed through the drag shakeout by a side-bar shuttle which engages tabs on the sides of the flask.

Fig. 14 — After shakeout, the empty flask is shuttle-indexed along the return conveyor to the drag molding station to be recirculated through the system.

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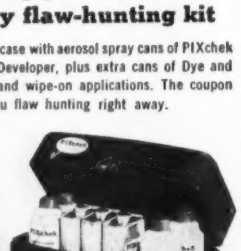

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Circle 560 on Page 53

With the Editors

A New Editor: Congratulations and best wishes to Bill Gude as he takes over as editor of FOUNDRY. After operating 23 years in that capacity, I am sure it is one of the most satisfying assignments a business paper editor can have. Not only is one privileged to serve a fine industry that has all the earmarks of a closely knit family, but he also has an acquaintanceship which includes hundreds of men who are contributing much to the progress of castings.

It's an interesting job, Bill. Hope you have as much real pleasure out of the future years as I have had during the past.

—o—

Notes on the Show: The AFS foundry show at Philadelphia was good, providing considerable interest to those fortunate enough to attend. Probably the most striking impression was the extent to which automatic and semiautomatic controls are being applied to the foundry industry. Most machines, which a few years ago were controlled by a lever, this time were equipped with panels, pushbuttons, and other equipment which controlled operations. There can be no doubt this trend will continue and will affect castings production.

The revolution taking place in the field of core binders was well illustrated at the show. While shell cores appeared to hold the stage this year, other types of binders left the impression that they are coming up fast. Many machines for producing molds and cores were in operation.

If one can judge by the comments heard over the week-end just prior to the opening of the show, the job of getting displays set up continues to grow more difficult and expensive. Labor, with its rules and regulations, its jurisdictional disputes, and its sly efforts to leave much of the work for the week-end when overtime applies, eventually will hurt the industrial show business and those cities where labor leaders gouge exhibitors, with the acquiescence of politicians. Some day, in some city, with some industrial show, this situation undoubtedly will blow higher than a kite.

—o—

In passing, I might mention that the big hall at Philadelphia which housed the majority of exhibits seems just as barn-like in 1960 as it did at the foundry show there in 1928. Because the hall management kept all the outside doors closed and evidently had no method of providing ventilation, it got mighty hot in the hall along in the late afternoon. The lighting also was poor.

A great change has taken place in the displays in 32 years. In many cases the beautifully designed, modern type of booth has replaced plain back drops, machines are painted bright colors instead of black, and some of the booth furniture shows a bright look that adds to the welcome for the footsore visitor looking for a place to rest.

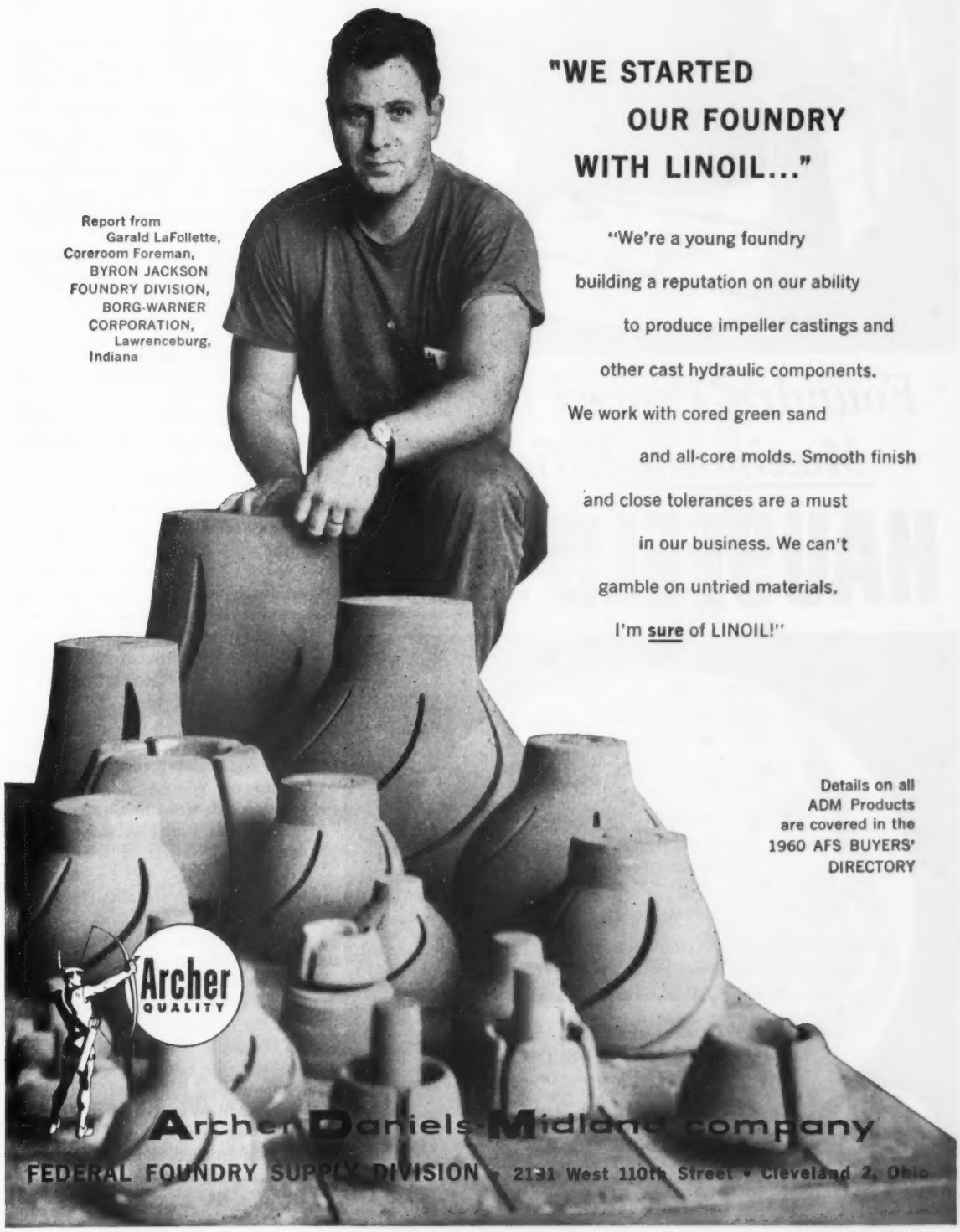
Speaking of tired dogs, may I thank the Martin Engineering Co., Neponset, Ill., for the use of their vibratory platform on several occasions during the show. Surely helps tired feet.

—o—

Old Issues: Our thanks to W. G. Brayer, foundry superintendent, Bausch & Lomb Optical Co., Rochester, N. Y., for dropping by our booth and leaving copies of FOUNDRY for December, 1912, and January and February, 1913. Mr. Brayer said he left another copy at the Pangborn booth because that company had the front cover advertisement. Many of the folks around the booth examined these copies and were struck with the changes that have taken place in FOUNDRY and the equipment and materials advertised.

—o—

Golden Anniversary: Back in 1884 when Henry E. Pridmore started his little foundry molding machine business at the behest of Cyrus McCormick, he probably never visualized the long history that would start from that modest beginning. It was at the time of the Haymarket riots in Chicago that Mr. McCormick, chairman of the board of International Harvester Co., advised young Pridmore to go into business for himself. Henry had, for some



"WE STARTED OUR FOUNDRY WITH LINOIL..."

Report from Garald LaFollette, Coreroom Foreman, BYRON JACKSON FOUNDRY DIVISION, BORG-WARNER CORPORATION, Lawrenceburg, Indiana

"We're a young foundry building a reputation on our ability to produce impeller castings and other cast hydraulic components. We work with cored green sand and all-core molds. Smooth finish and close tolerances are a must in our business. We can't gamble on untried materials. I'm **sure** of LINOIL!"

Details on all ADM Products are covered in the 1960 AFS BUYERS' DIRECTORY

Archer QUALITY

Archer Daniels Midland company

FEDERAL FOUNDRY SUPPLY DIVISION • 2131 West 110th Street • Cleveland 2, Ohio

Circle 561 on Page 53

Foundry Proved for Maximum Efficiency!

HAUSFELD TILTING CRUCIBLE FURNACES

- trouble-free tilt . . . *holds* in any position
- heavy duty cast iron trunnions surrounded by roller bearings
- precision-machined throughout
- arrives factory-assembled, factory-tested to operating temperature
- exclusive Hausfeld swing-top compensates for various size top covers

With crucible sizes from #40 to #400, there is a Hausfeld Tilting Furnace to help you boost your plant's efficiency. Write for full details today.

THE CAMPBELL-HAUSFELD CO.,
300-R Moore St., Harrison, Ohio

CAMPBELL-HAUSFELD
METAL MELTING FURNACES

time, been designing and making the many early molding machines for the McCormick company.

As the years went along, Henry's son, Edward A. Pridmore came into the business. In 1910, Edward left the company to form his own firm, International Molding Machine Co., and in 1914 merged his father's company with International.

In the years since, the third generation headed by Lawrence D. Pridmore, president, and Tyrell B. Eichler, secretary and treasurer, has operated the company, and today Lawrence D. Pridmore Jr., and Tyrell Eichler Jr., fourth generation of the family, are actively engaged in building molding machines for the foundry.

Congratulations and best wishes for a fine anniversary year to those at International.

—o—

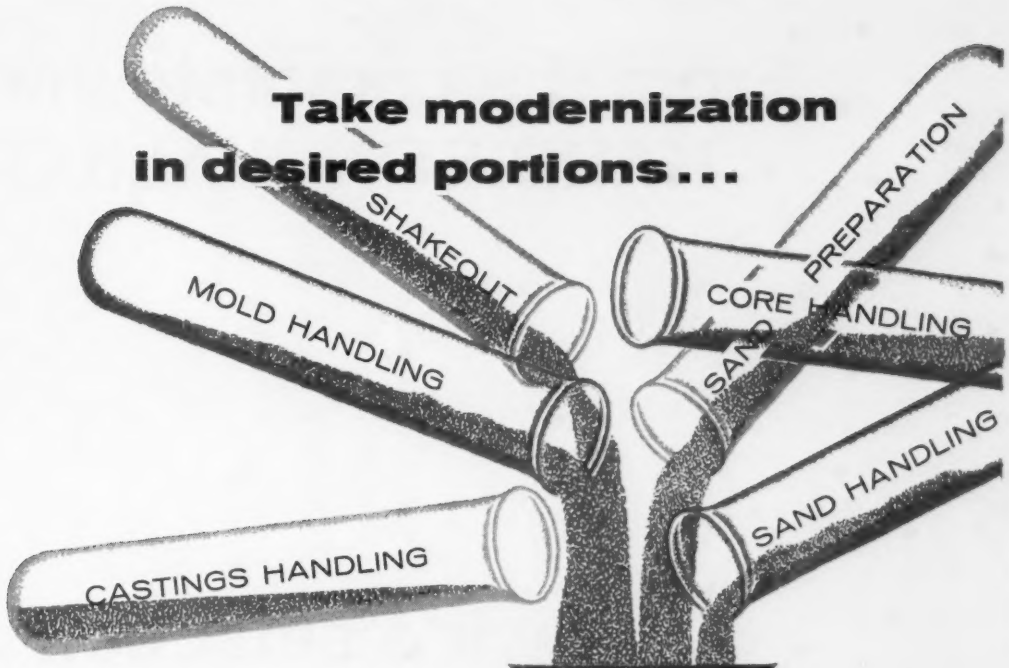
One of the Best: For many years, I have enjoyed greatly the copies of *The Iron Worker*, a publication of the Lynchburg Foundry Co., Lynchburg, Va. In my book, it is one of the best of the many fine house organs published by foundries throughout the United States. Combining interesting articles on the history of Virginia, especially the Lynchburg area, with information on developments in the foundry and among the personnel, *The Iron Worker* finds a wide audience.

The issue for the winter of 1959-60 is especially interesting since it marks the 40th anniversary of the publication.

As a part of the anniversary issue, the editors have presented an exact replica of Volume 1, Number 1, which made its initial appearance in 1919. Included in that issue is a historical sketch of the Lynchburg Foundry Co. and the contributions of that organization to World War I.

As mentioned in the present issue, Lucille McWane Watson, daughter of a Lynchburg Foundry Co. founder and sister of two of its presidents, was the originator and first editor of *The Iron Worker*. In 1934 her husband, the late E. Alban Watson, became editor with Mrs. Watson assisting. Mr. Watson retired in 1952. These two fine people, whom I have met and enjoyed, did much to make *The Iron Worker* one of the best in the field.

F.G.S.

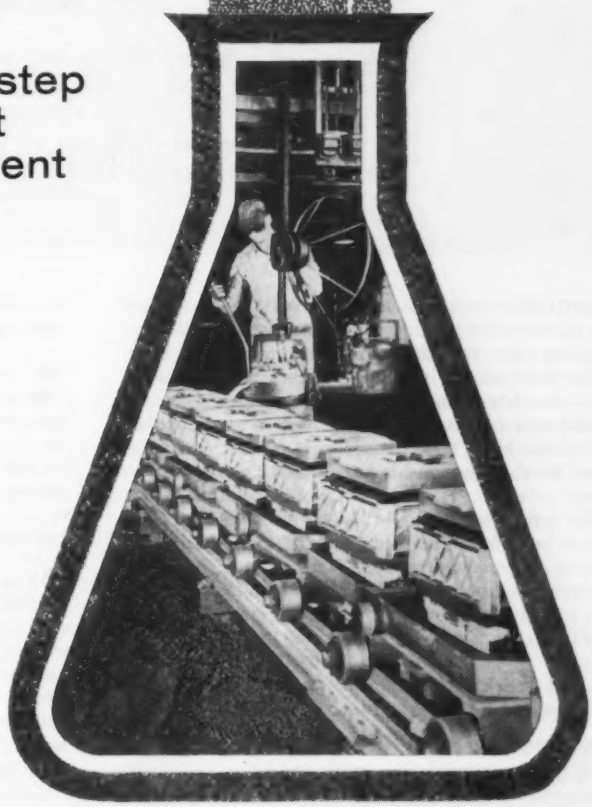


Mechanize step by step with Link-Belt equipment

LINK-BELT's "prescription" for a *more profitable* foundry is easy to take. With this step-by-step plan, you start by mechanizing where you need it most . . . then add equipment piece by piece according to a well-organized plan.

With industry's broadest line of conveyors and preparation equipment—plus know-how developed through 50 years of serving foundries—Link-Belt can match every need of your step-by-step improvement program. And, single components or complete system—you can be sure all are designed to save time, minimize hazards to health and safety, increase productivity with less cost.

Step-by-step mechanization requires long-range planning to achieve a systematic arrangement of equipment. That's where Link-Belt's vast experience pays off. Our specialists will put this experience to work for you . . . will help you set the modernization pace that suits you best. For details, call your nearest Link-Belt office or write for Book 2423.



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LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,104

FOUNDRY COLOR-SOUND FILM AVAILABLE! Thirty-minute film, "Foundry Flexibility," shows benefits of *complete* mechanization. It will be lent on request for viewing by your group. *WRITE LINK-BELT EXECUTIVE OFFICES TODAY.*

From the complete line of HARBISON-WALKER

FOUNDRY REFRACTORIES

. . . a wide selection of leading brands for each particular application

FOR CUPOLAS, (both acid and basic) Harbison-Walker provides all the different kinds of brick, castable and plastic refractories and ramming mixes. In the charging zone, H-W EXTRA STRENGTH CASTABLE makes a hard strong refractory concrete lining which is extremely resistant to impact and abrasion. In the melting zone of acid cupolas, highly siliceous H-W KUPLOMIX forms monolithic linings which are durable and readily maintained.

In basic practice, H-W MAGNEX CF (chrome free) chemically-bonded magnesite brick and the hard fired H-W MAGNESITE brick most satisfactorily fulfill the requirements for melting chromium-free metal. MAGNEX is a strong chemically-bonded magnesite-chrome refractory with which excellent records have been established in cupola linings.

H-W MAGNAMIX is a granular ramming mix of high magnesia content which is used both by itself and in mixtures with other materials of lower magnesia content to increase refractoriness and chemical resistance to highly basic slags.

FOR ELECTRIC FURNACES. Roofs — STAR, the standard of quality in conventional silica brick, and VEGA, the superduty silica refractory are widely preferred for their service records in steelmaking furnaces. Harbison-Walker superduty fireclay brick and the wide range of high-alumina brands provide for the most severe spalling conditions and highest working temperatures needed for various alloys.

Bottoms (Basic Practice)—H-W C-MIX used for contour-rammed electric furnace bottoms greatly reduces furnace downtime and avoids burning-in sacrifice of refractory construction.

Sidewalls (Basic Practice)—METALKASE brick in its several modifications is highly resistant to thermal spalling and corrosion by highly basic slags.

FOR MALLEABLE FURNACES. Among the Harbison-Walker brands noted for their splendid service in air furnace bottoms, sidewalls and bungs are ALAMO, superduty fireclay brick and ANKORITE 65 heat-setting mortar, pre-eminent in this application. Corresponding H-W brands along with high-duty fireclay and high-alumina brick made in various producing districts, afford transportation cost and delivery advantages.

FOR ALUMINUM FURNACES. Harbison-Walker has developed through sustained research and service studies several unique high-alumina refractories that are outstanding in resistance to penetration and reaction with molten aluminum and its alloys. These specialized brands—CORAL and CORAL P along with KORUNDAL brand, long established at many primary aluminum plants, have exceptional ability to withstand severe impact and abrasion and the severe corrosive conditions of exposure in bottoms and lower sidewalls.

CORALBOND is the companion mortar developed specifically for aluminum melting furnaces. It is outstanding in resistance to penetration and corrosion by aluminum alloys.

For upper walls and roofs, ALAMO and other time-tested brands of Harbison-Walker fireclay and superduty brick are regarded as standards. A number of Harbison-Walker monolith-forming refractories—plastics and castables—are used to advantage in bottoms, sidewalls and ladles, where strength and penetration-resistance are required.

FOR FOUNDRY LADLES, which comprise many sizes and types, Harbison-Walker lining materials include the many classes of brick in the alumina-silica fireclay group, super-duty fireclay and high-alumina brick, many plastic and castable refractories and ramming mixes. In addition, Harbison-Walker manufactures many standard sizes of sleeves and nozzles, noted for the best in refractoriness and excellent workmanship.

MOLDING MEDIA

CALAMO (for investment molds), one of the extensively used Harbison-Walker products for molding, is an alumina-silica refractory of optimum sizings for various molding mixtures. Its fusion point is 100°F. higher than that of normal silica sand mixes.

H-W FLINTGRAIN (for ceramic shell molds) is an alumina-silica refractory, similar in composition to CALAMO, having the same very desirable low thermal expansion characteristics, but greater angularity of grain shape.

The angular grain shape and optimum size distribution make H-W FLINTGRAIN ideal for securing maximum compactness in the mold. It is used with special benefit for making ceramic shell molds and for similar applications in which dense, compact mold section of greatest volume stability at all temperatures, are of paramount importance.

H-W MULLITE GRAINS and FLOURS (for precision molding of metals at extremely high temperatures) — These Harbison-Walker mullite products by virtue of their high-alumina composition and low content of basic oxides are very refractory. The hard dense grains are strong and most resistant to fluxing. Excellent thermal stability accounts for their unusual constancy of volume up to their very high temperature limit.

GATE and RUNNER TILE — Harbison-Walker refractory gate and runner tile, available in many sizes of splendid workmanship, withstand rapid metal flow without excessive erosion, resulting in cleaner metal and reduced scrap loss.

FOR OTHER APPLICATIONS, Harbison-Walker products include: monolithic and brick linings for annealing and heat treating furnaces; all the classes of insulating firebrick for service at various temperatures up to 3000°F; plastic graphite refractories; a complete line of bonding mortars, and many specialized refractory materials.

WRITE for the new descriptive folder, "Harbison-Walker Products for the Foundry Industry"—and for complete technical information, consult your nearest Harbison-Walker Sales Office.

Harbison-Walker Refractories Company

AND SUBSIDIARIES GENERAL OFFICES: PITTSBURGH 22, PENNA.

World's Most Complete Refractories Service

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WHY PAY MORE

when you can buy the best binder at the lowest price!

INSIST ON STEINEX

the original CO_2 Binder available only from CarVer

BEST QUALITY Steinex gives you absolutely the best shakeout —BY FAR!

BEST PRICE Steinex is 30% lower in cost than any other binder on the market!

BEST SERVICE Carver has the in-the-foundry experience and know-how to help you use Steinex in your CO_2 operation — successfully and profitably!

JOIN THE HUNDREDS OF FOUNDRIES THAT INSIST ON THE BEST

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NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

CALENDAR of Meetings

June 2-3—New York University, vacuum metallurgy conference, University Heights (Bronx) Campus, New York.

June 6-7—Malleable Founders' Society, annual meeting, Elbow Beach Surf Club, Hamilton, Bermuda.

June 6-8—Material Handling Institute Inc., New England Show, Commonwealth Armory, Boston.

June 7 — Hoist Manufacturers Association, Waldorf-Astoria Hotel, New York.

June 19-21—Alloy Casting Institute, annual meeting, Homestead, Hot Springs, Va.

June 21-24—Institute of British Foundrymen, annual conference, Winter Gardens, Malvern, England.

June 21—Electric Overhead Crane Institute, Alliance, Ohio.

June 26-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 4-6—European Investment Casters Conference, Liege, Belgium.

Sept. 6-16—The Machine Tool Exposition—1960, International Amphitheatre, Chicago.

Sept. 6-16 — Production Engineering Show, Navy Pier, Chicago.

Sept. 19-20—Steel Founders' Society, fall meeting, Homestead, Hot Springs, Va.

Sept. 19-24—International Foundry Congress, Zurich, Switzerland.

Sept. 22-23—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 26-28—Standards Engineers Society, annual meeting, Hilton Hotel, Pittsburgh.

Oct. 12—Cast Bronze Bearing Institute, annual meeting, Grove Park Inn, Asheville, N. C.

Oct. 12-14—Gray Iron Founders' Society, annual meeting, Netherland Hilton Hotel, Cincinnati.

Oct. 13-15—Non-Ferrous Founders' Society, annual meeting, Grove Park Inn, Asheville, N. C.

Oct. 17-18—Magnesium Association, annual convention, Hotel Carter, Cleveland.

Oct. 17-21—American Society for Metals, National Metal Exposition & Congress, Trade and Convention Center, Philadelphia.

Oct. 17-21—National Safety Council, Annual Safety Congress, Chicago.

Oct. 20-22—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 21-23—Society for Experimental Stress Analysis, annual meeting, Pick Fort Shelby Hotel, Detroit.

Oct. 22-25—Conveyor Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Nov. 1-3—Material Handling Institute Inc., Central States Show, Kentucky Fair and Exposition Center, Louisville.

Nov. 3-4—Michigan Regional Foundry Conference, Bancroft Hotel, Saginaw, Mich.

Nov. 8-11—Society of Die Casting Engineers, First National Die Casting Exposition & Congress, Detroit Artillery Armory, Detroit.

Nov. 14-16—Steel Founders' Society, Technical and Operating Conference, Pick Carter Hotel, Cleveland.

Nov. 30 - Dec. 2 — Metallurgical Society of AIME, Electric Steel Conference, Morrison Hotel, Chicago.

1961

April 18-23—Foundry Educational Foundation, annual college-industry conference, Hotel Statler, Cleveland.

Integrate Your Core and Mold Operation with

CARVER COMPATIBLE CO_2 PRODUCTS

STEINEX — THE ORIGINAL CO_2 BINDER
(Available only from CARVER).

CARVER RAPID MULLER

KRAUSS Taper-Slot CORE VENTS

Only Carver Compatible CO_2 Equipment working together can achieve the maximum volume and efficiency necessary to greater foundry profits!

Match any CARVER muller, shooter or gasser against similar models of other well-known lines and CARVER will out-perform them hands-down!

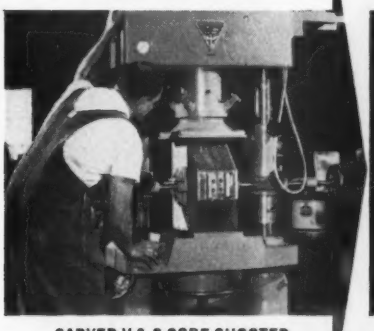
Match a *complete* CARVER installation against that of any other and *the over-all gain will be even greater.* The answer is COMPATIBILITY!

Every CARVER machine was designed to implement the other — in speed — in ease of operation — and in low maintenance requirements.

Working together they produce more cores and molds at far greater savings in labor, operating, and binder costs.

Cores produced by CARVER COMPATIBLE CO_2 EQUIPMENT are recognized by their faster, more uniform hardening; closer adherence to specifications; and easier shakeout.

Can you settle for anything less?



CARVER V & S CORE SHOOTER

CARVER AUTOMATIC GASSING APPARATUS

CarVer FOUNDRY PRODUCTS CO. MUSCATINE, IOWA

CARVER FOUNDRY PRODUCTS CO. Muscatine, Iowa F6
Please send information and prices on:

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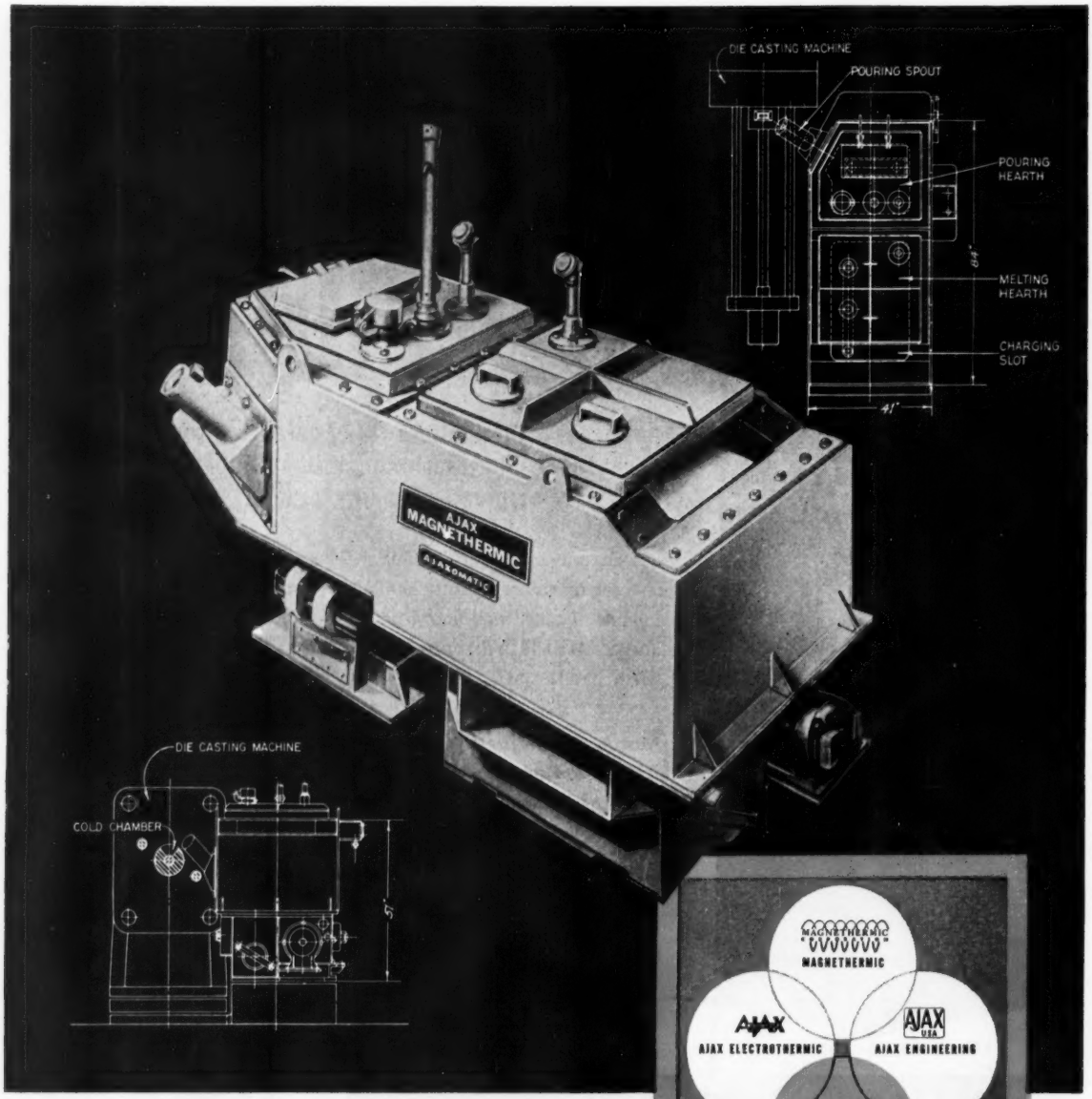
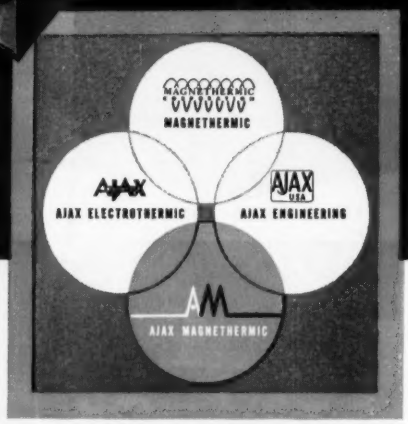


Duplex Ajaxomatic for melting and holding metal for automatic casting operations.



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The Automatic Pouring Ajaxomatic, one of many products by AM, for the heating or melting of metals by Induction.

"induction heating is our only business"

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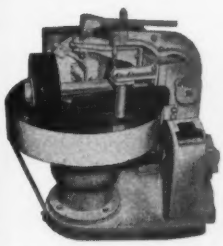
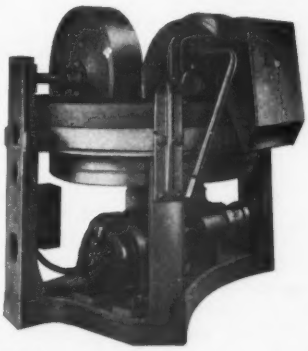
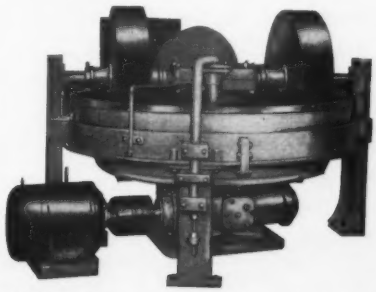


No. 251 2½-ft. diameter
. . . . ½ to 1 cu. ft. batch

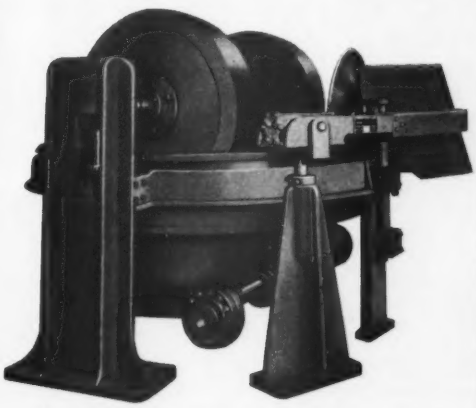
No. 414 4-ft. diameter
. . . . . 2 to 4 cu. ft. batch



No. 610 6-ft. diameter. . . . 10 to 14 cu. ft. batch



No. 715 7-ft. diameter. . . . 15 to 20 cu. ft. batch



No. 930 9-ft. diameter. . . . 30 to 40 cu. ft. batch

ANY SIZE MADE TO YOUR SPECIFICATIONS

From compact portables to heavy-duty mullers

CLEARFIELD

CAN SUPPLY THE RIGHT MIXER FOR YOUR JOB

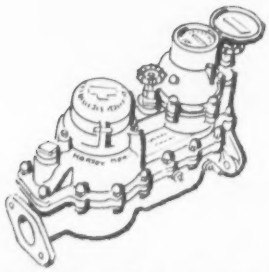
Clearfield Mixers are available in capacities ranging from ½ to 40 cu. ft. . . . for batch or continuous mixing. They're constructed of rugged cast iron for strength, rigidity and wear resistance. And all Clearfield mixers feature the "revolving pan" mixing principle which keeps the material in *constant* state of violent motion; this eliminates the "lag" intervals which result in mixers with mullers and scrapers that revolve instead of the pan. With Clearfield revolving-pan mixers you get a constant controlled-course mixing action which assures a better balance of blending and tempering.

Whether you need a mixer for maintaining proper bond and moisture in heap sands . . . preparing facing sand or core sand for castings . . . or for any foundry application where sand control is important . . . Clearfield Mixers can do the job better, and save you production money.

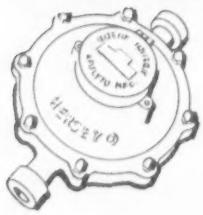
Let us help you determine the best type and size for your particular needs. No obligation. Meanwhile, send for Catalog No. 90.

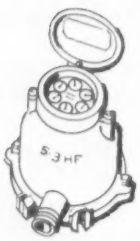
CLEARFIELD
MACHINE COMPANY
CLEARFIELD, PENNSYLVANIA, U.S.A.

Circle 568 on Page 53



Leading water meter manufacturer installs DETROITS to cut operating costs



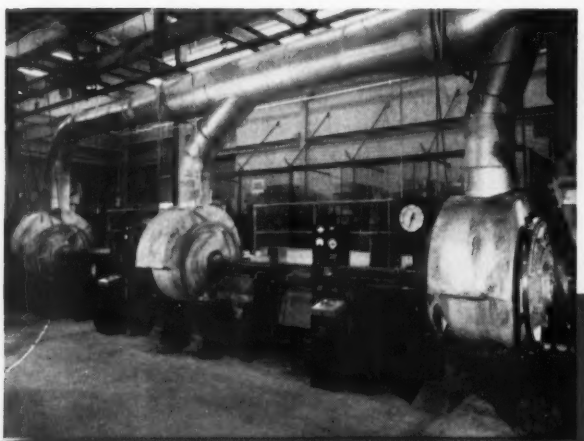


"The Detroit Electric Furnaces we recently installed are giving the fast melts and performance required. We expect even greater savings as we go along.

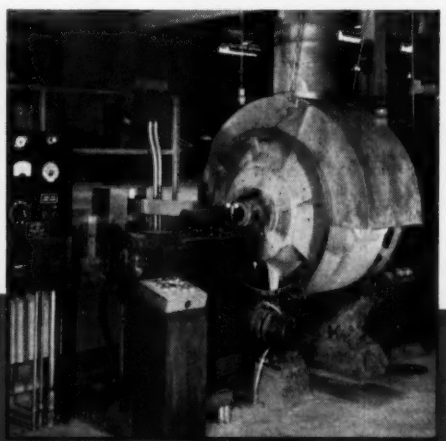
"These units give us new flexibility in our daily operations and control we never had in the past," says Charles M. Pate, foundry superintendent of the Hersey Manufacturing Company of Dedham, Massachusetts.

Hersey Manufacturing Company, one of the oldest leading manufacturers of water meters in the country, recently converted to three Detroit rocking electric furnaces as a step in reducing its foundry operation costs. Although it is too early for a complete tabulation of results, Hersey reports an appreciable savings in fuel cost, melt loss, maintenance and manpower. Hersey expects the Detroits to pay for themselves in a relatively short time—and its operating costs on the whole to be much lower now that Detroits are on the job.

As Hersey is demonstrating, the place to cut foundry costs is right where they start—at the furnace. Send us your requirements. We'll gladly show you how Detroit Electric Furnaces cut operating costs.



A battery of three 700 lb., 175 KW Detroits give Hersey a steady stream of fast melts. Continuous rocking action washes the metal over the refractory, fully utilizing heat. This motion also assures complete homogeneity. Automatic controls accurately repeat the cycle time after time.



Here is one of the three automatically controlled "rocking action" Detroit LFYP's installed by Hersey. Angle of rock can be set for any desired length of time. Electrode controls are also automatic.

DETROIT ELECTRIC FURNACE DIVISION

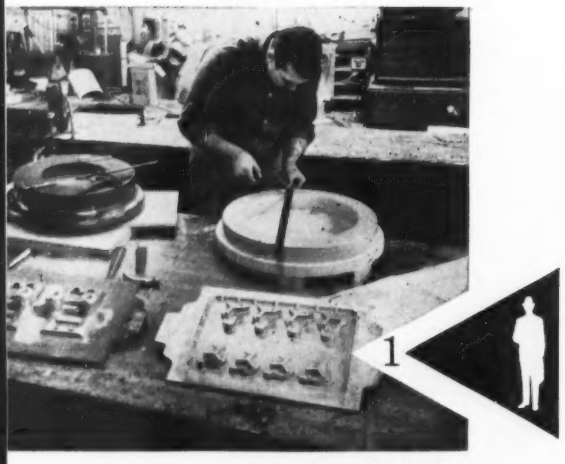
Kuhlman Electric Company

Bay City, Michigan

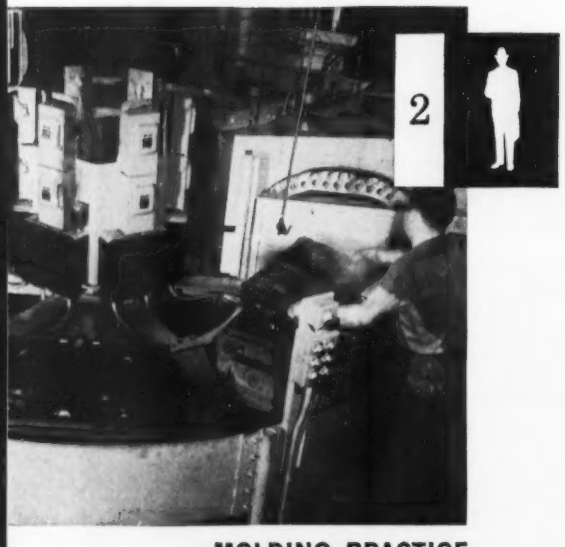
Foreign Representatives: In BRAZIL—Equipamentos Industriais, "Eisa" Ltd., Sao Paulo. CHILE, ARGENTINA, PERU and VENEZUELA—W. Gardner Inc., 150 Broadway, New York 38, N. Y.; MEXICO, Cia Proveedora de Industrias, S.A. Apartado Postal No. 2783, Mexico 1, D.F., Mexico

Circle 569 on Page 53

REPUBLIC FOUNDRY SERVICE ENGINEERS CAN HELP YOU PRODUCE



PATTERN MAKING



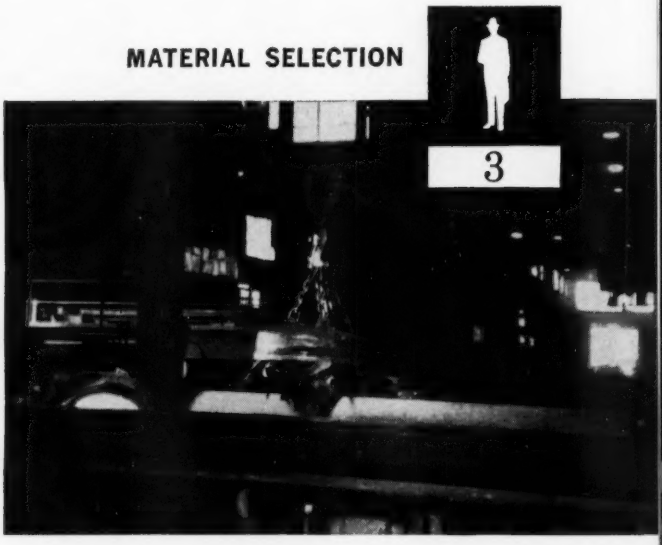
MOLDING PRACTICE

Republic Foundry Service Engineers offer you more than metallurgical assistance. Their practical foundry experience and thorough knowledge of pig iron behavior qualifies them to assist you in every department of your foundry operation as illustrated on these pages.

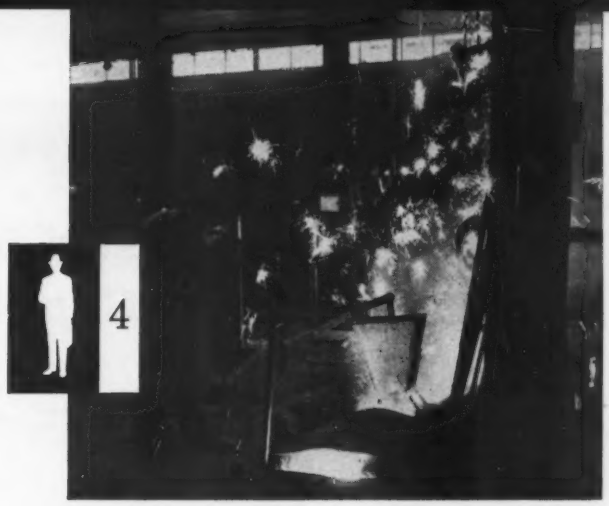
They have at their fingertips information on and a working knowledge of the latest processes and techniques available for improving castings, and for expanding their use and sale. Their suggestions often result in improved operating procedures, increased production efficiency, and in recapturing business lost to other materials.

When it comes to the important matter of pig iron selection, the Foundry Service Engineer recommends

MATERIAL SELECTION

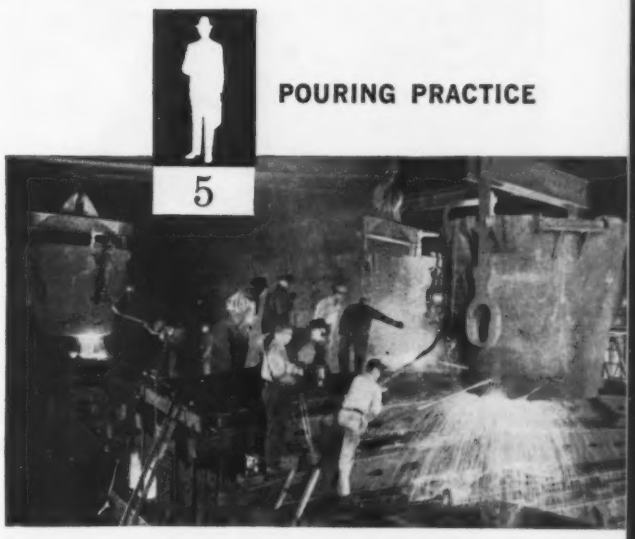


MELTING PRACTICE



BETTER CASTINGS, PROFITABLY

POURING PRACTICE



the grade best suited to your requirements. He shows no prejudice, applies no pressure to promote one grade of pig iron over another, because Republic produces the most complete line in the industry. Northern grades include Chateaugay, Foundry, Malleable, Bessemer, and Basic. Southern furnaces produce Foundry and Basic.

Foundry Service Engineers form the basis of Republic's Complete Foundry Engineering Service—a concept designed to help you produce better castings more efficiently, economically, and profitably. Foundry Service Engineers are available to all foundries without obligation. Mail the coupon for prompt service, or for more information on Republic's complete line of irons.

FINISHING

REPUBLIC STEEL

PRODUCERS OF INDUSTRY'S MOST COMPLETE LINE OF MERCHANT PIG IRONS

Circle 570 on Page 53

REPUBLIC STEEL CORPORATION
DEPT. FO-9690
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Foundry Service Engineer call
☐ Send more information on Republic Pig Irons

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

IMC A REPORT TO FOUNDRIES FROM TOM BARLOW

In case you missed it at the convention, here is the Cupoliner 77

This picture is shown sideways to exaggerate the unusual mobility of the machine.

This particular Cupoliner 77 is the size for small operations, or as a "spare" for larger operations. Also, it is handy for odd jobs such as ladles, electric furnaces, forehearths — or even as emergency equipment for stopping cupola run-outs. The same gun is available (at extra cost, of course) up to 3000-pound capacity (larger is possible if we find a demand for it).

CAN YOU BENEFIT FROM:

1. A gun that sells for less than $1,000?
2. A gun convertible to "fully remote control"?
3. A gun that is fully portable?
4. A gun with extremely low maintenance?
5. A gun that requires less air?
6. A gun that will shoot any dry material?
7. A gun especially designed for Cupoline 77*?
8. A gun with fewer knobs to pull?

* Cupoline 77 is the new, low-rebound, fast-setting gun patch that is reducing patching costs for foundries all over the country. (Even people who used to make their own are changing to 77.)

EASTERN CLAY PRODUCTS DEPARTMENT

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

IMC PRODUCTS FOR GROWTH*

*TRADEMARK

ADMINISTRATIVE CENTER, OLD ORCHARD ROAD, SKOKIE, ILLINOIS, ORCHARD 6-3000

PAYLOADER®

THE OVERWHELMING CHOICE

10,000 "HA" units

More than 10,000 of this Model HA "PAYLOADER" have been sold to foundries, fertilizer and chemical plants and to other industrial users — more than any other rubber-tired tractor-shovel.

The Model HA continues to be one of the most popular tractor-shovels in the complete "PAYLOADER" line. Its reputation for digging power — to scoop up and carry 2,000 lb. loads — to maneuver in close quarters with its short turning radius . . . its day-after-day dependability and low cost of operation — are some of the reasons for its sustained popularity.

FOR MAXIMUM CONTINUOUS PRODUCTION in close quarters the new Model H-25 "PAYLOADER" is recommended. It has an even shorter turning radius (6 ft.) than the Model HA and more operating capacity (2,500 lbs.), more power, plus full power-shift transmission and power-steer for faster cycling and easy, effortless operation. It is the production champion in its class.

A SIZE FOR ANY JOB: For greater bulk materials handling capacity, indoors or outdoors, larger "PAYLOADER" units are available — up to 12,000 lb. operating capacity. Your Hough Distributor is ready to supply your need and to back it up with the most complete service-parts facilities.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER and PAY are registered trademark names of The Frank G. Hough Co., Libertyville, Ill.

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.
Send me "Industrial Materials Handling the PAYLOADER Way."

Name _____
Title _____
Company _____
Street _____
City _____ State _____

6-A-3

News about

B.F.Goodrich Chemical *raw materials*

Photo shows core-making operation at I-F Manufacturing Company, New Philadelphia, Ohio.

I-F MANUFACTURING COMPANY TELLS HOW:

new Good-rite CB-40 cuts drying time sharply

The new low-gassing mold and core binder, Good-rite CB-40, really performs on light metal precision casting. Here's what I-F Manufacturing Company, New Philadelphia, Ohio, says:

Faster production: A drastic reduction in dielectric oven time cuts costs. Conventional binders formerly required at least 1½ hours of baking—now Good-rite CB-40 cuts baking time to 10 minutes on this job. Good-rite CB-40 can be used with any present method—oven temperature isn't critical, it is safe at all stages, is non-inflammable, releases no objectionable fumes.

Excellent collapsibility and shakeout: Rate of collapse is chemically controlled to prevent burn-in. Collapsed sand flows freely from castings.

Low-gassing: The exceptionally small amounts of gas mean that blow holes are completely eliminated. Scrap is reduced. Finer sands can be used, producing unusually smooth finishes and eliminating machining. Good-rite CB-40 provides excellent dimensional stability in the core, which results in far closer tolerances in the casting.

More information: You can learn about improved production and lowered production costs with Good-rite CB-40 by writing Dept. JE-3, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Good-rite CHEMICALS

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

why it'll pay you to see PICKER *first*

about radiographic inspection problems

1 here you get exactly the **right machine**—x-ray or isotope—*e.g. to handle your problem best (x-ray is better for some jobs, isotopes for others). Nowhere else can you find anything even approaching the range of radiographic equipment Picker offers *(see index below for some idea)*

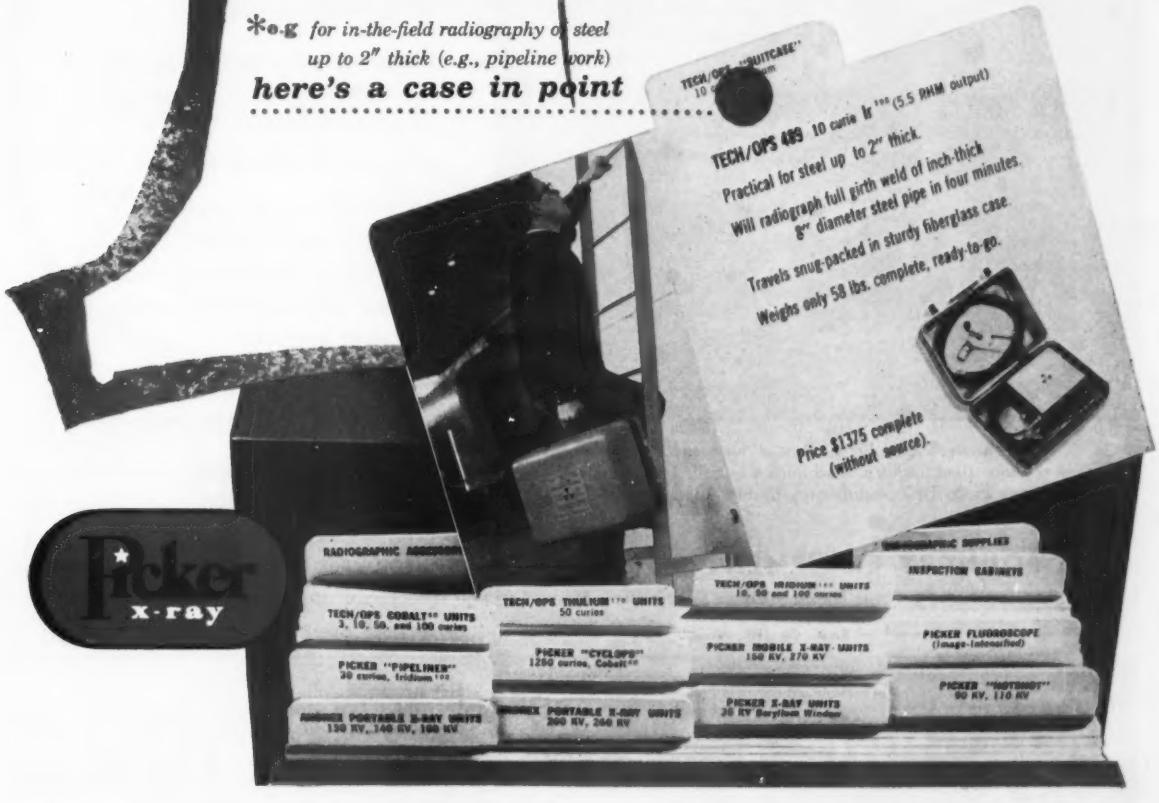
1 here you get **topflight local service** - the dependable facilities of the nationwide Picker X-Ray service network. Right in your own backyard there's probably a local Picker office with service engineers constantly on the job to keep your equipment running at peak form.

1 here you get **expert counsel** on *anything* and *everything* having to do with radiography or fluoroscopy. We'll test radiograph your own product and come up with recommendations. Advise you on exposure technics: plan and supervise shielded installations—go the whole way *with* you, *for* you. We even offer a training course on Basics of Radiography: it comes free with the purchase of Picker equipment.

1 all this at your command by simply calling your local Picker office (see 'phone book) or writing Picker X-Ray Corporation, 25 South Broadway, White Plains, New York.

*e.g. *for in-the-field radiography of steel up to 2" thick (e.g., pipeline work)*

here's a case in point


TECH/OPS 499 10 curie Ir*** (5.5 RHM output)
Practical for steel up to 2" thick.
Will radiograph full girth weld of inch-thick 8" diameter steel pipe in four minutes.
Travels snug-packed in sturdy fiberglass case.
Weighs only 58 lbs. complete, ready-to-go.
Price $1375 complete (without source).
Picker X-ray
RADIOGRAPHIC ACCESSORIES
TECH/OPS COBALT** UNITS 3, 10, 50, and 100 curies
PICKER "PIPELINER" 30 curies, Iridium 192
TECH/OPS THULIUM*** UNITS 50 curies
PICKER "CYCLOPS" 1250 curies, Cobalt**
TECH/OPS MEDIUM*** UNITS 10, 50 and 100 curies
PICKER MOBILE X-RAY UNITS 150 KV, 270 KV
PICKER X-RAY UNITS 25 KV Beryllium Window
RADIOGRAPHIC SUPPLIES
INSPECTION CABINETS
PICKER FLUOROSCOPE (Image-Intensified)
PICKER "HOTSHOT" 90 KV, 110 KV

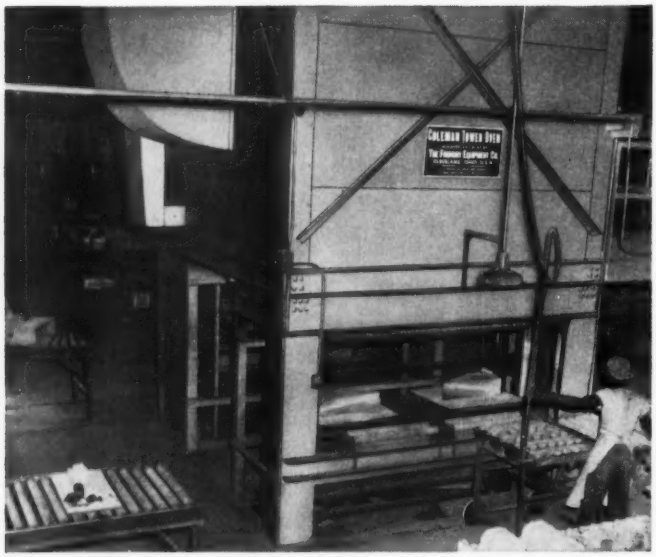
no capital investment if you'd rather rent ● ask about the PICKER RENTAL PLAN

CUT LABOR COSTS

with

Coleman Dielectric Core Oven in leading plumbing fixture foundry. Direct labor alone reduced by 75%, with many other important savings and advantages.

Coleman Conveyor Core Ovens



Coleman Tower® Core Oven. One of two large installations in a major steel foundry. Mechanized handling and baking of cores up to 150 pounds at substantial annual savings.

● **Performance records in all types of foundries prove that Coleman Conveyor Core Ovens reduce core department costs by as much as 50%!**

Coleman Ovens quickly pay for themselves out of direct savings in labor, materials and reduced casting scrap.

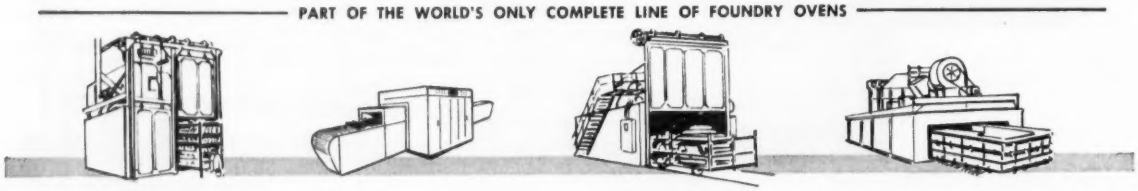
As builders of the world's only complete line of foundry ovens . . . dielectric or recirculating heat . . . we can recommend, without bias, the right oven for your particular needs.

WRITE FOR BULLETIN 54

THE FOUNDRY EQUIPMENT COMPANY • **1821 COLUMBUS ROAD, CLEVELAND 13, OHIO**

World's Oldest and Largest Foundry Oven Specialists—More than half a century of specialized foundry experience.

PART OF THE WORLD'S ONLY COMPLETE LINE OF FOUNDRY OVENS



TRANSRACK OVENS | DIELECTRIC CORE OVENS | CAR TYPE OVENS | JET ACTION MOLD OVENS

Circle 575 on Page 53

There are not many users who have changed permanently to other fluxes once they've tried

Famous CORNELL CUPOLA FLUX

THEY found Cornell Cupola Flux is a scientifically prepared mixture of high grade fluorspar and other materials which greatly increases slag flow off.

Famous Cornell Cupola Flux is easy to use. With each ton charge of iron toss one scored brick into the cupola. Cost? Just a few cents per ton of metal to make gray iron and malleable iron cleaner and produce castings of greater tensile strength that are easier to machine. Write for Bulletin 46-B.

IF you melt aluminum, copper or brass, try Famous Cornell Aluminum, Copper or Brass Flux. Write for Bulletin 46-A.

We have no argument with those who sell for less . . . They know what their merchandise is worth!

The **CLEVELAND FLUX** *Company*

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

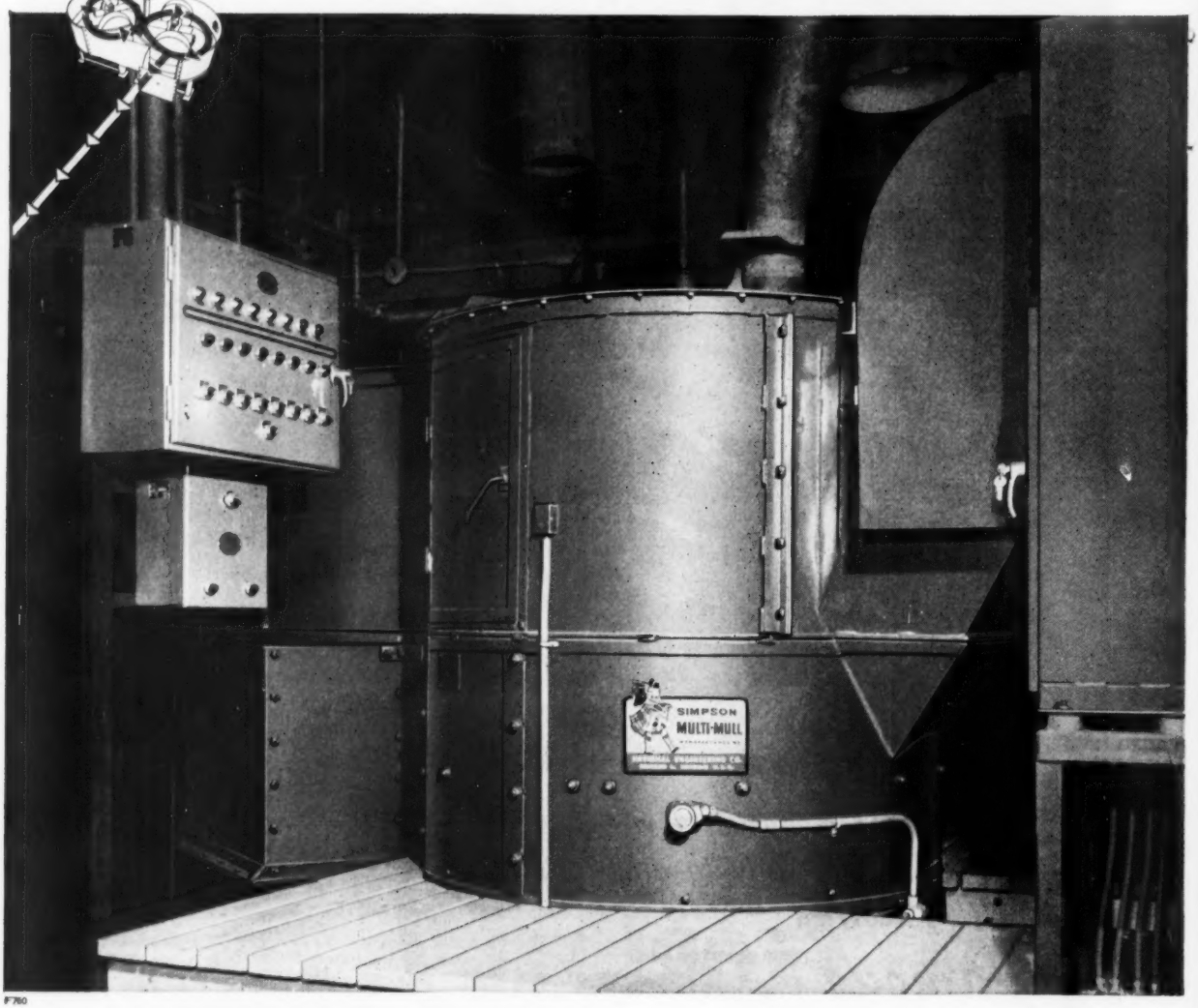
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

Circle 576 on Page 53

HOW WOLVERINE BRASS IMPROVED CASTING



F760

SIMPSON MULTI-MULL GOES TO WORK

Wolverine Brass Works, Grand Rapids, Michigan, wanted to improve their casting finish. A switch-over to synthetic sand and better control over sand properties was indicated . . . so was a new mixer. Their pug mill, though it could meet *quantity* requirements, could not turn out the *quality* of sand needed to meet these Wolverine requirements:

- A continuous, but variable, flow of sand to the molders.
- Moisture control within $\pm 0.1\%$ limits.
- Improved flowability, green strength and permeability of molding sand.

National helped them to accomplish this and *more* with a Model 21½F Simpson Multi-Mull . . . a unit especially designed to meet the foundryman's increasing need for *mulled* system sands in continuous quantities. After one year's operation, here's what Wolverine reports:

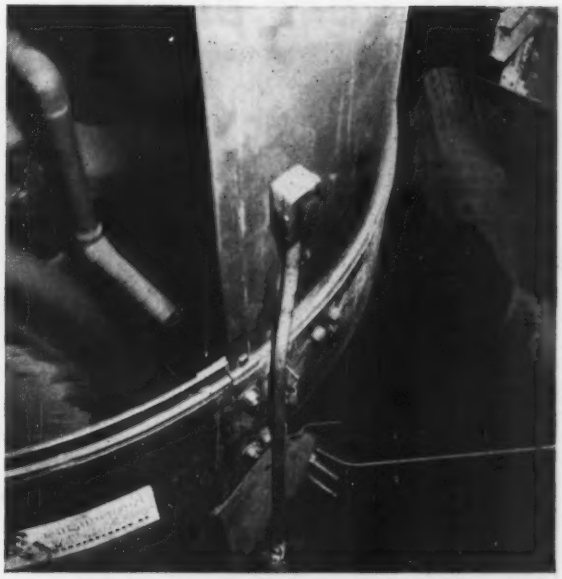
- Sand flow can be paced to molding requirements. System can deliver anywhere from 1 to 40 tons of sand per hour.
- Green strength increased.
- Continuous mulling system requires little operator attention.
- Electronic moisture control device eliminates human element.
- Sand properties greatly improved; reduced clay balls, better flowability, less mold tear.
- Superior casting finish.

If you're looking for high continuous production of *mulled* system sand, investigate *Multi-Mull*. A new National bulletin shows you how it can deliver up to 50% more hourly production than two batch mixers of equivalent pan diameter.

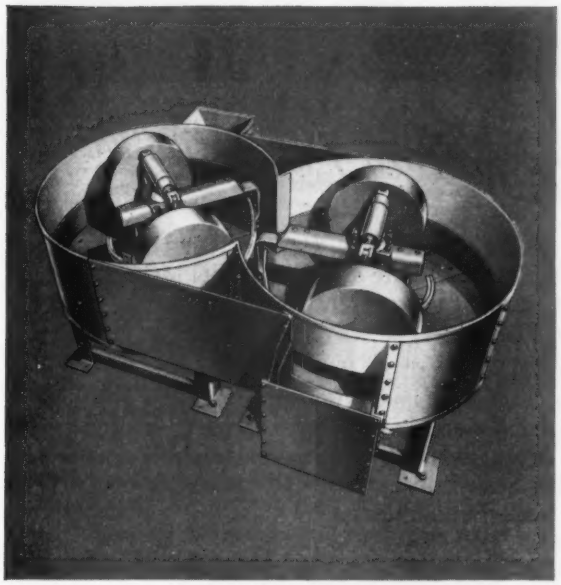
Write for a copy.

QUALITY WITH CONTINUOUS MULLING

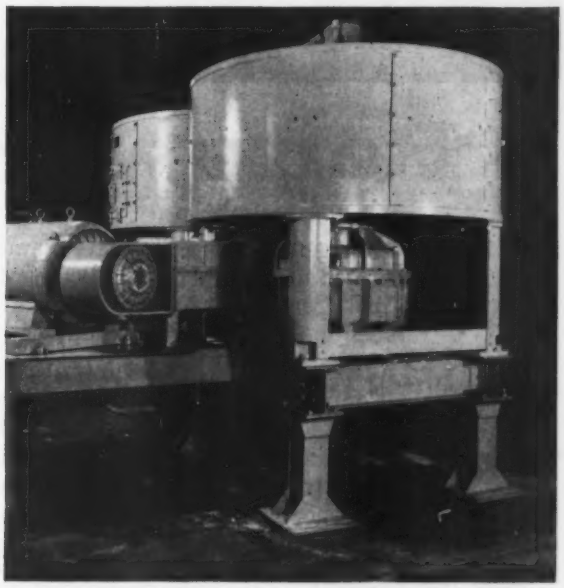
At Wolverine Brass, automatic monitoring system controlled by probe into hopper (arrow) assures ready supply of sand to the molders at all times.



Properly mulled sand controlled for moisture to within ± 0.1% is discharged to boot of bucket elevator at rates which can be controlled from 1 to 40 tons per hour.



The Simpson Multi-Mull is available in 6 models in retention capacities of 600 to over 9000 lbs. Hourly production capacities can be as much as 50% greater than two batch mixers of equivalent size.



Model 23F Multi-Mull . . . built to same exacting standards and utilizing the same proven mulling principle established by batch-type Simpson Mix-Mullers in almost 50 years of foundry service.

SIMPSON MULTI-MULL

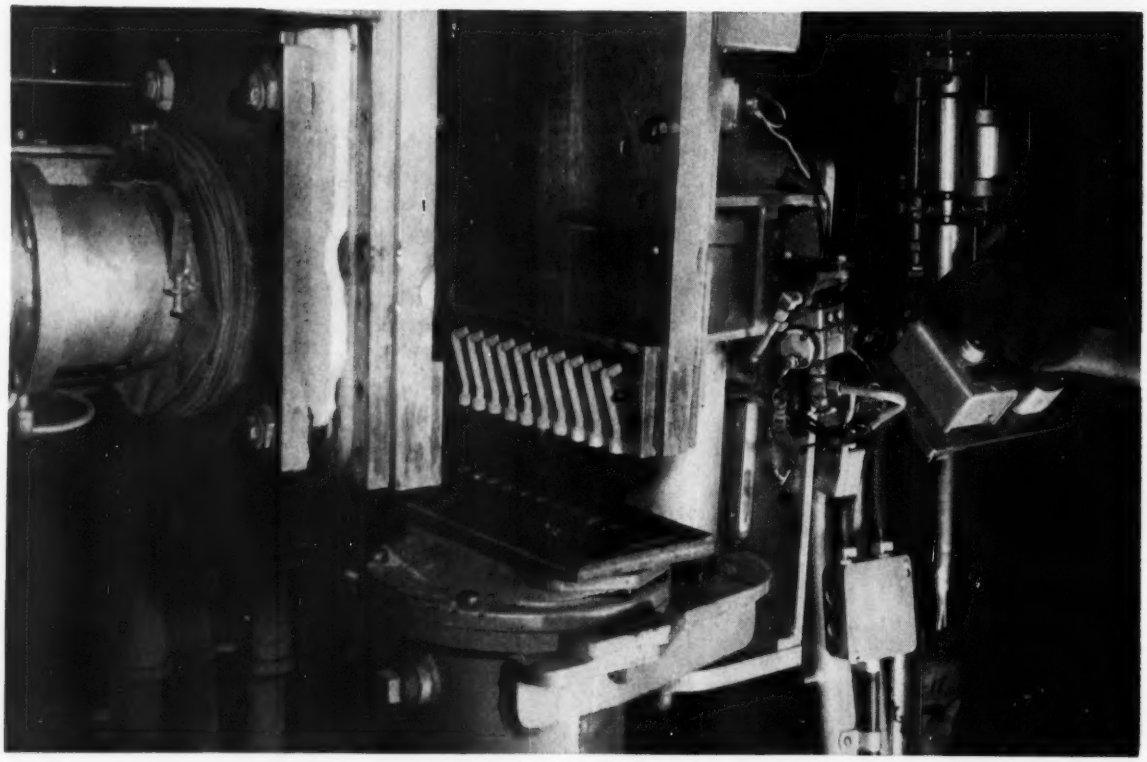
NATIONAL ENGINEERING COMPANY

646 Machinery Hall Bldg.
Chicago 6, Illinois

In Canada: 17 Queen St., East, Toronto 1

Circle 577 on Page 53

FAST, INEXPENSIVE AUTOMATION OF SHELL CORE BLOWER



with Bellows "Controlled Air Power"

Management of progressive Canton Malleable Iron Co., Canton, Ohio turned to Bellows "Controlled-Air-Power" to automate a Shalco Model MC-5 Shell Core Blower. Now, a woman operator can consistently produce 4500 top quality cores per day without fatigue.

At the push of a button, interlocked and synchronized Bellows "Controlled-Air-Power" Devices advance the core body and sand hopper cylinders, roll the unit over 180°, release the sand-resin mix, expedite and time its flow, return the entire assembly to its original position, and retract the core body and sand hopper cylinders . . . all automatically! The operator merely loads, presses a button and unloads.

This is only one example of practical, low-cost "spot-a-mation" of various foundry operations with Bellows equipment. It is described in detail, with equipment list and wiring diagram, in Bellows "Spot-A-Mation" Idea File 11.0-8. For your free copy, address Dept. FO 660, Bellows-Valvair, Akron 9, Ohio. In Canada, Bellows-Valvair, Ltd., Toronto 18, Ontario.

1344B-3

Bellows-Valvair

The Bellows Co. • Valvair Corp. Akron 9, Ohio

DIVISIONS OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

Circle 578 on Page 53

Late News

EQUIPMENT SALES RISE: Sales of foundry equipment hit their highest level in a year during March, when the Foundry Equipment Manufacturers Association index (1947-49 monthly average is 100 per cent) reached 159.9.

The Material Handling Institute index for March did almost as well, when it got to 133.60 (1954 monthly average equals 100), the highest since June, 1959, and the third straight month to show an increase. In April, new orders for industrial heating equipment totaled $12,464,000, up 38 per cent from the March volume.

ONLY A RECORD: How are business prospects? Speaking in Washington recently at a meeting of the Society of Business Magazine Editors, Secretary of Commerce Frederick H. Mueller said, "This is not a boom year. It is only a record year."

This year's first quarter reached a record level in value of goods and services produced. April and May showed good gains in employment, and income of individuals moved to a new high. Auto production in May rose over April; usually there is a decline. Spending for plants and equipment this year will top 1959 by 14 per cent, the latest government report indicates. It also will exceed the previous peak set in 1957 slightly.

SCRAP FREIGHT RATES: Spokesmen for the Institute of Scrap Iron & Steel Inc. have urged an immediate adjustment in freight rates in the East—namely, establishment of a third minimum for transporting scrap in the eastern area. They asked for a minimum for 100,000-lb

Foundry Statistics

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap Total	By Types of Furnace — Cupola Total	Air Total	Electric Total
1958				
Dec.	4,973,670	761,494	80,593	712,779
Total	50,242,746	7,725,970	821,388	7,152,728
1959				
Jan.	5,375,042	783,045	86,519	767,289
Feb.	5,657,873	791,137	88,326	801,692
Mar.	6,677,499	873,982	101,986	965,048
Apr.	6,644,905	911,313	106,972	996,126
May	6,642,572	868,661	99,256	1,029,573
June	6,322,404	885,497	104,683	997,921
July	3,584,931	750,208	87,441	603,726
Aug.	1,875,165	691,786	81,184	374,678
Sept.	2,114,015	801,588	99,090	441,134
Oct.	2,266,709	798,569	98,279	445,137
Nov.	4,796,896	614,233	82,784	801,555
Dec.	7,021,870	843,040	99,577	1,008,158
Total	58,979,881	9,613,059	1,156,097	9,232,037
1960				
Jan.	7,043,488	823,442	95,442	1,058,159

Index of Foundry Equipment Orders

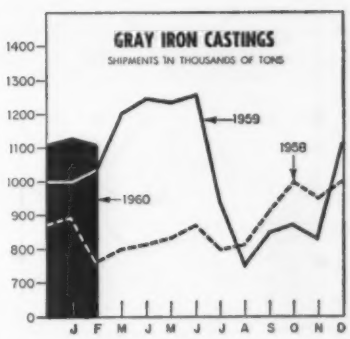
Foundry Trades Only

(Net Orders Closed, New Equipment)

	1959	1960
Jan.	127.4	95.5
Feb.	237.1	128.6
Mar.	166.6	159.9
Apr.	154.2	....
May	157.0	....
June	125.1	....
July	110.7	....
Aug.	134.1	....
Sept.	131.3	....
Oct.	140.8	....
Nov.	131.2	....
Dec.	95.9	....

Note: Base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.



GRAY IRON CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings — Total	All Castings — For Sale	Miscellaneous Castings Total	Miscellaneous Castings For Sale	Nodular Iron Castings Total	Heavy Steel Ingot Molds Total	Chilled Railroad Car Wheels Total	Pressure Pipe & Fittings Total[2]	Soil Pipe & Fittings Total[2]	Unfilled Orders[3]
1958	10,371,232	5,863,154	6,155,378	2,657,197	117,588	1,884,396	265,114	1,277,685	788,659	.....
1959										
Feb.	1,036,655	538,514	642,882	252,115	12,619	230,706	31,035	75,476	56,556	766,063
2 mo.	2,038,426	1,055,904	1,268,486	502,276	24,680	445,691	58,685	151,718	113,941	.....
Mar.	1,205,572	566,034	701,527	286,692	13,881	270,293	35,820	106,131	89,801	846,937
Apr.	1,245,702	688,755	726,105	295,982	14,663	270,476	35,655	129,861	83,606	892,214
May	1,236,250	685,285	706,073	285,507	16,003	275,563	36,960	141,675	75,979	884,779
June	1,252,016	717,067	707,291	295,064	15,510	268,479	30,723	160,540	84,983	836,707
July	532,713	532,912	599,422	252,915	14,508	99,670	20,486	133,175	79,960	897,536
Aug.	743,564	506,756	485,444	254,232	11,046	13,482	18,479	145,853	80,306	872,993
Sept.	850,043	528,145	595,435	279,357	11,875	19,416	16,272	142,660	76,260	883,278
Oct.	871,779	520,322	622,599	277,927	17,797	20,155	19,647	139,716	69,662	886,970
Nov.	831,504	516,032	493,508	250,342	12,698	165,139	16,723	96,086	60,048	885,368
Dec.	1,107,741	584,516	650,145	271,221	14,651	294,129	20,595	92,139	50,733	845,575
Total	12,315,310	7,001,728	7,556,035	3,251,515	167,312	2,142,498	309,945	1,440,883	865,949	.....
1960										
Jan.	1,135,575	591,804	677,392	277,100	16,774	295,994	18,463	86,798	56,928	851,336
Feb.	1,107,721	571,143	678,927	279,190	16,430	284,738	17,848	76,332	49,876	855,324
2 mo.	2,243,296	1,162,947	1,356,319	556,290	33,204	580,732	36,311	163,130	106,804	.....

*Source: U. S. Dept. of Interior Bureau of Mines. [1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

Late News

cars which is 25 per cent below the existing minimum on 80,000 lb. Basis for the request is the institute's contention that increases in freight rates for scrap have contributed to the declining use of such material in recent years.

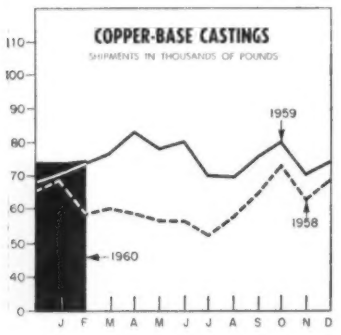
STEEL FOUNDRY SOLD: Los Angeles Steel Casting Co., Los Angeles, has been purchased by the Shaffer interests of Brea, Calif. Established 58 years ago, Los Angeles Steel Casting produces castings up to 10,000 lb and has a monthly capacity of about 700 tons. No changes in personnel or policies are planned. The company employs about 450 persons.

ELECTS OFFICERS: New officers and directors of the Magnesium Association, New York, were elected last month in London at a week-long meeting with the group's British counterpart, the Magnesium Industry Council. Charles A. Howe, president, Hills-McCanna Co., Chicago, was elected president. New vice presidents are Edward H. Perkins, vice president, Brooks & Perkins Inc., Detroit, and J. E. Pepall, president, Magnesium Co. of Canada, Montreal. Ralph D. Ferguson, general manager, Bendix Foundries, Teterboro, N. J., was named treasurer, and Jerry Singleton was re-elected executive secretary.

FREIGHT CARS: Deliveries of new freight cars totaled 5579 in April, compared with 5950 in March and 3741 in April, 1959. Orders in April rose to 5551, a steep increase over the 1959 ordered in March and well over the 3736 which went on the books in April, 1959. The backlog stood at 41,003 on May 1, against 35,479 a year ago.

ALUMINUM USAGE: Primary aluminum production continues at a high rate, with 168,596 tons in April. This figure compares with 155,213 tons a year ago but is slightly below the 170,688 tons produced in March. Next year will see still greater usage according to James M. Smith, head, engine section, sales development division, Aluminum Co. of America, Cleveland. Speaking at the AFS convention in Philadelphia, he predicted that at least 60,000 tons of aluminum castings will be required for compact automobile engines during the 1961 model year, or double the 1960 figure.

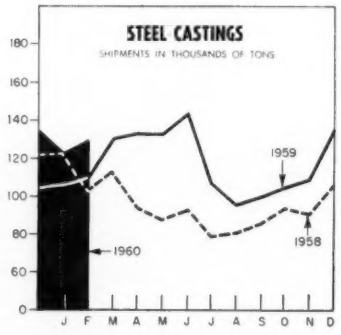
Foundry Statistics



COPPER-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments			
	Total	Sand	Perm. Mold	Unfilled Orders[2]
1958	762,484	697,360	31,854	.....
1959				
Feb.	72,754	64,558	4,007	26,468
2 mo.	142,877	126,824	7,760	.....
Mar.	78,641	69,472	4,333	29,373
Apr.	82,799	73,567	4,640	29,941
May	78,413	69,351	4,363	27,074
June	79,366	70,512	4,421	30,389
July	69,073	61,650	3,869	31,820
Aug.	68,979	60,346	4,410	32,117
Sept.	75,739	66,211	4,809	29,396
Oct.	79,832	69,583	5,172	28,092
Nov.	70,674	61,490	4,893	29,147
Dec.	73,558	64,579	4,337	29,243
Total	899,951	793,585	53,007	.....
1960				
Jan.	73,971	65,742	3,915	26,053
Feb.	74,246	65,500	4,198	28,161
2 mo.	148,217	131,242	8,113	.....



STEEL CASTINGS—SHIPMENTS

(Net tons[1])

	All Castings			Carbon			Alloy			
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Unfilled Orders[2]
1958	1,121,000	856,986	149,644	801,846	606,240	136,251	319,154	250,746	13,393	.....
1959										
Feb.	110,280	86,013	14,686	79,635	61,261	13,316	30,645	24,752	1,370	245,096
2 mo.	215,672	168,696	29,094	155,607	120,284	26,264	59,795	48,408	2,830	.....
Mar.	131,317	103,848	20,086	96,309	75,968	18,410	35,008	27,880	1,676	270,682
Apr.	134,344	104,890	21,372	99,295	76,802	19,761	35,049	28,088	1,611	271,613
May	135,359	105,804	23,525	101,504	78,767	22,498	33,855	27,037	1,327	263,969
June	143,624	111,725	26,567	107,000	82,485	24,568	36,624	29,240	1,999	248,782
July	106,448	83,540	16,007	77,990	60,501	14,520	28,458	23,039	1,487	274,065
Aug.	98,014	79,188	17,607	74,825	60,243	16,373	23,189	18,945	1,234	279,261
Sept.	99,731	79,963	13,975	73,648	58,453	12,830	26,083	21,510	1,145	256,871
Oct.	105,570	84,850	11,819	80,127	63,901	10,978	25,443	20,108	841	268,874
Nov.	109,460	86,026	11,764	77,320	59,294	10,799	29,305	26,732	965	301,858
Dec.	133,346	104,138	18,868	99,643	77,517	17,200	33,703	26,621	1,668	306,346
Total	1,412,885	1,112,668	210,984	1,043,538	814,219	194,201	366,612	298,449	16,783	.....
1960										
Jan.	122,565	94,052	22,016	93,197	70,815	20,891	29,368	23,237	1,125	314,237
Feb.	129,259	97,927	26,532	96,878	72,963	25,328	32,371	24,964	1,204	279,684
2 mo.	251,824	191,979	48,548	190,075	143,778	46,219	61,739	48,201	2,329	.....

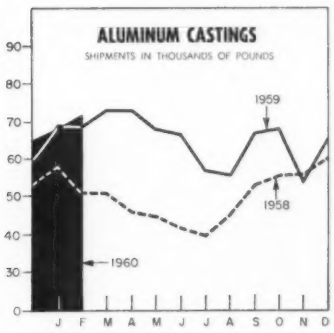
[1]Source: Bureau of the Census. [2]For sale only.

Transportation-motor vehicles already comprise the market for 59.5 per cent of permanent mold aluminum castings and 14.3 per cent of aluminum sand castings. They also are the biggest users of aluminum diecastings.

PERSONALS: H. S. Faust has been elected chairman of Hansel-Elcock Co., Chicago. George R. Winter, formerly executive vice president, succeeds him as president . . . B. D. Claffey, vice president, Dayton Malleable Iron Co., Dayton, has been appointed general director of the firm's Ohio Malleable Div., Columbus, Ohio, as well as of its G.H.R. Foundry Div., Dayton. Kenneth Henry, who has been general superintendent, G.H.R. Div., was named plant manager . . . James C. Reiger has been elected president, Shahmoon Industries Inc., New York, succeeding S. E. Shahmoon, who continues as chairman . . . T. E. Kramer, formerly vice president and general manager, American Alloys Inc., Kansas City, Mo., has been named vice president of foundry operations, Ross Pattern & Foundry Development Co., Sidney, Ohio . . . E. E. O'Connor has been appointed resident manager, Hickman, Williams & Co., Cleveland . . . Melvin S. Earl has joined Bearing Bronze Casting Co., Cleveland, as sales manager . . . New appointments at Aluminum Co. of America, Pittsburgh, include Robert T. Ferguson, technical manager of pig and ingot sales, and Frederick C. Irving Jr., technical manager of casting sales . . . Glen T. Cahill has been named administrative assistant at Hamilton Foundry Inc., Hamilton, Ohio.

OBITUARY: William R. Tanner, 68, president, Zenith Foundry Co., West Allis, Wis., died May 18 . . . Earle C. Smith, chief metallurgist and research director, Republic Steel Corp., Cleveland, died May 20 . . . Jerome L. Thies, president, Fenton Foundry Supply Co., Dayton, Ohio, died May 15.

MAGNESIUM DIECASTINGS: Dow Chemical Co., Midland, Mich., will install a $400,000 customer-service diecasting laboratory equipped to demonstrate the most modern techniques available for melting and casting magnesium. Equipment in the laboratory will include 500 and 1500-ton diecasting machines and a low-pressure permanent mold operation which now is under development.



PRODUCTION WORKERS

Estimated Number

	Feb. 1960	Jan. 1960	Feb. 1959
Ferrous	200,700	197,700	184,400
Nonferrous	55,300	55,400	51,600

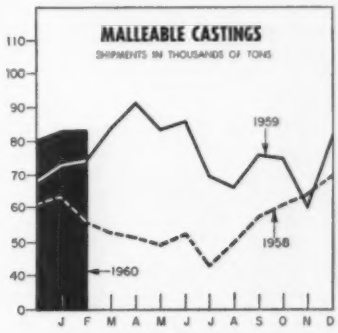
Average Weekly Earnings

Gray Iron	$101.00	$100.28	$93.38
Malleable Iron	97.11	100.61	93.77
Steel	101.53	100.49	101.81
Nonferrous	101.40	103.16	97.44

Average Weekly Hours

Gray Iron	40.4	40.6	39.4
Malleable Iron	39.8	40.9	39.9
Steel	39.2	39.1	40.4
Nonferrous	40.4	41.1	40.6

Source: Bureau of Labor Statistics.



ALUMINUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1958	641,700	125,487	224,092	290,275	.....
1959					
Feb.	68,381	10,802	25,428	32,147	82,001
2 mo.	137,277	22,040	50,272	64,960	.....
Mar.	73,351	12,412	26,964	33,949	82,676
Apr.	72,976	12,700	26,153	33,992	85,636
May	68,268	11,979	25,283	30,877	80,325
June	66,479	12,312	24,927	29,092	81,228
July	56,911	11,581	20,410	24,786	80,450
Aug.	55,904	11,130	17,824	26,818	82,488
Sept.	66,193	12,309	21,506	32,239	81,839
Oct.	67,499	12,958	21,781	32,640	78,930
Nov.	54,557	10,813	16,326	27,303	84,392
Dec.	65,069	12,409	20,078	32,463	86,947
Total	784,474	141,503	273,814	371,428	.....
1960					
Jan.	68,247	11,278	22,368	34,514	92,109
Feb.	71,792	11,855	23,336	36,493	84,494
2 mo.	140,039	23,133	45,704	71,007	.....

[1]Source: Bureau of the Census. [2]For sale only.

MALLEABLE IRON CASTINGS

(Shipments of castings—net tons[1])

	Shipments Total	For Sale	Standard Total	For Sale	Pearlitic Total	For Sale	Unfilled Orders[2]
1958	660,650	383,839	540,600	313,597	120,050	70,242	.....
1959							
Feb.	74,760	42,093	57,573	31,976	17,187	10,117	90,291
2 mo.	147,946	85,760	114,273	67,115	33,673	18,645	.....
Mar.	84,335	49,690	67,439	40,515	16,896	9,175	95,822
Apr.	90,974	54,306	75,583	43,835	18,391	10,471	102,508
May	83,472	49,619	66,512	40,438	16,960	9,181	99,879
June	85,497	51,411	68,426	42,453	17,071	8,958	95,339
July	69,184	43,128	55,120	35,787	14,064	7,341	75,252
Aug.	65,062	40,143	53,217	33,224	11,845	6,919	85,552
Sept.	76,063	46,469	60,209	36,619	15,854	9,850	82,274
Oct.	75,511	48,625	61,683	40,088	13,828	8,537	85,031
Nov.	58,258	42,235	48,951	33,981	9,307	8,254	82,555
Dec.	80,060	45,917	61,455	35,891	18,605	10,026	93,874
Total	916,362	557,303	729,868	449,946	186,494	107,357	.....
1960							
Jan.	83,188	46,154	63,637	35,933	19,551	10,221	100,302
Feb.	83,118	46,850	64,131	37,391	18,987	9,459	98,272
2 mo.	166,306	93,004	127,768	73,324	38,538	19,680	.....

Prices of Foundry Metals and Coke

(As of May 30, 1960)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$18.00-$18.50

OVEN

Birmingham	$30.35
Buffalo	32.00
Detroit	32.00
Erie, Pa.	32.00
Indianapolis	31.25
Kearny, N. J.	31.25
Milwaukee	32.00
Neville Island (Pittsburgh)	30.75
New England, deld.	33.55
New Haven, Conn.	31.00
Painesville, O.	32.00
Philadelphia	31.00
St. Louis	33.00
St. Paul	31.25
Swedeland, Pa.	31.00
Terre Haute, Ind.	31.25

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Boston, deld.	75.25	75.75
Buffalo	66.50	67.00
Chester, Pa.	Nom.	Nom.
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

ALUMINUM: 99 per cent plus primary ingots 28.10. Secondary No. 12 alloy, 25.00-25.25. Deoxidizing grades: No. 1, 25.00; No. 4, 22.25.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 33.00, delivered Connecticut valley.

ZINC: High grade 14.50, delivered. Die casting alloy No. 3, 16.25; No. 2, 16.75, delivered.

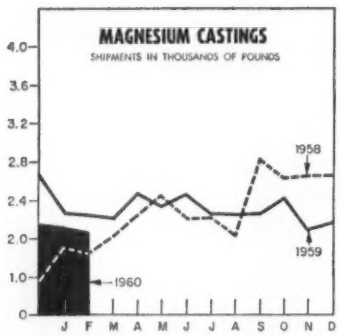
Iron and Steel Scrap

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$28.00-29.00	$49.00-50.00	.....	.....	.....	.....	$45.00-46.00
Boston*	**25.00-26.00	**39.00-40.00	.....	.....	**40.00-42.00	.....	.....
Buffalo	30.00-31.00	**42.00-43.00	.....	.....	**48.00-49.00	.....	50.00-51.00
Chicago	32.00-33.00	42.00-43.00	.....	49.00-50.00	49.00-50.00	48.00-49.00	49.00-51.00
Cincinnati*	**28.50-29.50	**38.00-39.00	**35.00-36.00	.....	**49.00-50.00	.....	**53.00-54.00
Cleveland	31.00-32.00	44.00-45.00	30.00-31.00	50.00-51.00	50.00-51.00	49.00-50.00	54.00-56.00
Detroit*	**25.00-26.00	**36.00-37.00	**30.00-31.00	**43.00-44.00	.....	.....	.....
Los Angeles	32.00	40.00-46.00	.....	.....	.....	.....	.....
New York*	31.00-32.00	37.00-38.00	30.00-34.00	.....	.....	.....	.....
Philadelphia	35.00	41.00	43.00	.....	51.00-52.00	53.00-54.00	.....
Pittsburgh	33.00-34.00	42.00-43.00	.....	47.00-48.00	50.00-51.00	.....	56.00-58.00
St. Louis*	31.00	45.00	35.00	47.00	.....	.....	43.00
San Francisco	34.00	46.00	28.00	40.00	40.00	.....	.....
Seattle	35.00	35.00	31.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Foundry Statistics



ZINC-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1958	590,071	400,471	.....
1959			
Feb.	51,368	35,478	57,437
2 mo.	106,807	74,139	.....
Mar.	57,600	40,700	62,657
Apr.	57,325	40,127	55,916
May	60,656	43,920	62,224
June	56,128	40,226	54,097
July	46,756	34,606	52,677
Aug.	46,566	34,682	56,090
Sept.	58,144	40,397	60,953
Oct.	59,214	42,594	57,814
Nov.	46,720	37,410	58,076
Dec.	60,606	39,516	65,723
Total	656,520	468,317	.....
1960			
Jan.	61,537	39,777	64,940
Feb.	65,594	44,804	61,022
Total	127,131	84,581	.....

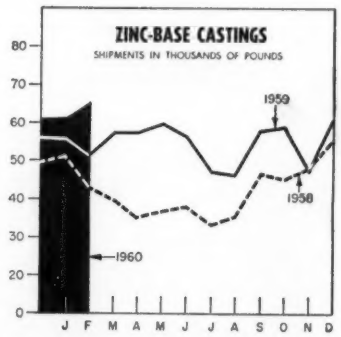
PIG IRON

PRODUCTION*—Net Tons

	Foundry	Malleable & Silvery	Low & Int. Low Phos. & Bessemer
1958	1,622,320	2,448,917	4,954,554
1959			
Mar.	173,881	341,218	412,533
3 mo.	485,989	862,573	1,203,836
April	159,950	296,384	427,227
May	198,126	358,087	474,820
June	188,158	346,231	441,052
July	166,378	173,760	258,935
Aug.	N.A.	N.A.	N.A.
Sept.	N.A.	N.A.	N.A.
Oct.	N.A.	N.A.	N.A.
Nov.	148,660	180,927	216,063
Dec.	177,017	306,303	452,426
Totals[3]	1,889,445	2,810,359	3,471,683
1960			
Jan.	128,232	325,151	462,667
Feb.	148,238	338,866	471,755
Mar.	126,357	333,182	462,914
3 mo.	402,827	997,199	1,397,336

CONSUMPTION*—Gross Tons

	Cupola	Air	Electric
1958			
Dec.	321,741	16,610	25,450
Total	3,314,652	169,267	231,145
1959			
Jan.	321,302	17,113	36,783
Feb.	324,876	17,960	37,414
Mar.	353,985	20,625	42,464
Apr.	366,378	21,997	41,597
May	358,192	20,424	40,812
June	366,136	20,390	39,867
July	311,327	16,391	20,437
Aug.	288,547	15,937	4,923
Sept.	336,015	18,057	6,033
Oct.	351,679	20,011	5,749
Nov.	276,168	16,350	28,231
Dec.	334,524	18,613	47,045
Total	3,989,129	223,868	351,355
1960			
Jan.	328,242	18,634	45,936



MAGNESIUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1958	28,776	25,024	.....
1959			
Feb.	2,249	1,995	4,637
2 mo.	4,540	4,061	.....
Mar.	2,129	1,924	4,465
Apr.	2,455	2,213	4,787
May	2,370	2,093	5,102
June	2,484	3,207	4,664
July	2,265	1,875	3,995
Aug.	2,243	1,753	3,809
Sept.	2,263	1,832	3,823
Oct.	2,436	1,890	3,501
Nov.	2,023	1,628	3,281
Dec.	2,163	1,731	3,423
Total	27,371	24,227	.....
1960			
Jan.	2,135	1,588	3,209
Feb.	2,085	1,689	3,280
Total	4,220	3,277	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.

Whitehead's FINE SILICA SANDS for Fine Finish Castings and Shell Molding

Whitehead offers the widest variety of fine washed and unwashed silica sands . . . all laboratory-tested in a Whitehead laboratory in each of the areas represented.

DIVIDING CREEK, New Jersey
Fine Washed Silica Sands

Retained on Sieve #	Grade D #71	Grade D Special #75	Grade E #96	Grade Overflow #118	Grade Superior #158
30	none	none	none	none	none
40	2.0	1.0	1.0	.2	.2
50	9.8	4.8	7.6	3.2	1.8
70	26.4	14.0	20.4	13.2	4.6
100	41.0	40.2	31.8	29.0	11.2
140	15.0	29.8	17.2	20.2	22.4
200	4.4	8.2	10.8	15.4	25.6
270	.8	1.2	5.6	8.8	14.0
Pan	.6	.8	5.6	10.0	20.2

McCONNELLSVILLE, New York
Fine Unwashed Silica Sands

Retained on Sieve #	#103	#130	#155	#180	#230	#275
30	.3	.2	none	none	none	none
40	.5	.2	.4	"	"	"
50	4.2	.4	1.4	"	.2	"
70	13.6	1.6	3.2	.4	.2	.2
100	26.1	12.4	10.2	2.5	.4	.6
140	25.7	32.8	22.0	18.0	4.0	1.2
200	20.8	37.2	30.0	35.9	21.4	6.4
270	5.5	9.8	14.2	17.4	21.4	11.2
Pan	3.3	5.4	16.8	23.8	46.4	80.4
Very Fine	none	none	1.8	2.0	6.0	

NEW ENGLAND
Marion Fine Washed Silica Sand AFSF #105

Sieve #	Retained
+6	none
12	"
20	"
30	"
40	.6
50	1.4
70	6.0
100	30.6
140	34.4
200	19.2
270	4.6
Pan	3.2

BLANEY, SOUTH CAROLINA
Washed Silica Sands

	55 B (50 — 60)	65 B (60 — 70)	80 B (70 — 95)	140 B (130 — Plus)	120 B (110— 135)
30	3.6	.4			
40	14.0	3.8	1.0		.5
50	27.7	15.6	6.6	.2	3.4
70	28.7	29.4	21.0	1.4	11.2
100	18.1	28.6	32.8	8.0	20.4
140	6.8	16.2	27.0	24.6	25.8
200	1.0	4.2	8.4	28.4	18.2
270	.1	1.4	2.4	21.8	12.1
Pan		.4	.8	15.6	8.2
AFS	51	68	82	161	121

LEADER IN FOUNDRY SANDS SINCE 1841

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
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Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DUO RESIN
Binder for baking with controlled oven temperatures

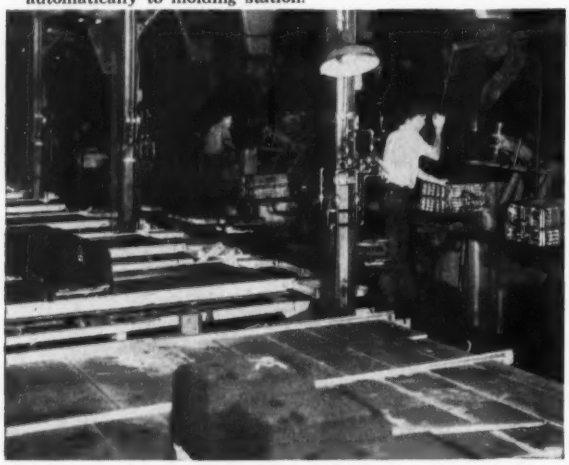
JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

Circle 579 on Page 53

TILT! Palletized molds ride Jeffrey pallet mold conveyor to dumping station. Operator tilts platform to dump sand and castings on Jeffrey vibrating pan conveyor. Operator reverses platform to roll pallet underneath pouring floor. Pallet returns automatically to molding station.



No manual handling in pouring operations. Ladles are carried on overhead trolley; palletized molds ride on Jeffrey conveyor. ▼

Mechanization with JEFFREY helps modernize foundry for 25% boost in production

Automation is the key to foundry productivity and cost problems today. In recognition of that fact, The Deming Company, leading manufacturer of pumps and water systems, recently completed a thorough modernization of its iron foundry at Salem, Ohio.

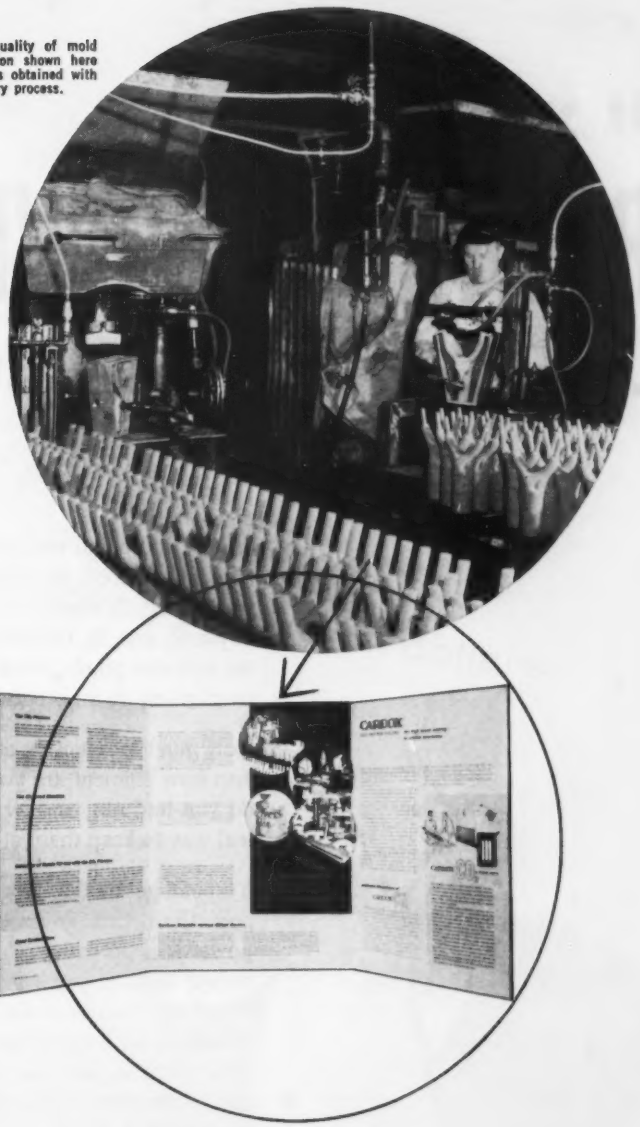
Jeffrey foundry conveying and special handling equipment plays a big part in the 25% production increase—in the same physical plant—realized by eliminating manual handling and speeding operations. A big factor in equipment selection was the minimum maintenance experienced with Jeffrey units in operation since the plant was first built. In the words of Deming foundry management: "Jeffrey equipment is tops—well worth the added service it gives".

Jeffrey offers a complete service to foundries seeking greater productivity. We study the basic requirements, engineer the right conveying and processing equipment, handle erection if desired. In foundries, as in basic industry everywhere, it pays to consult Jeffrey. The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...
TRANSMISSION MACHINERY... CONTRACT MANUFACTURING

The speed and quality of mold and core production shown here typifies the results obtained with Cardox CO_2 foundry process.



Want volume casting production

with speed and dimensional accuracy?

What are the critical elements which must be controlled for maximum efficiency with the CO_2 foundry process?

What kind of sand should be used with the CO_2 process?

What makes the CO_2 process work?

These are just some of the many questions answered for you in this important Cardox booklet.

Foundrymen agree, the CO_2 core and mold hardening process is an established part of your industry. This booklet helps show why — and also shows how the Cardox semi-precision molding process can combine new productive efficiency with economy for you.

As an important improvement over conventional CO_2 foundry techniques, the process is enabling a growing number of foundries to save money while producing more castings — with smoother finishes and to closer tolerances — than ever before. Machining time is minimized, set-up time is reduced. And this is accomplished with little or no additional equipment expense, no major change in existing production methods.

Send for your copy of this authoritative Cardox booklet — another example of the complete Cardox Technical Service available to you. Simply fill in the coupon and mail it to Cardox. It could be the first step towards bringing true operating efficiency to *your* foundry.

CARDOX®

CO_2

CORE HARDENING

SEMI-PRECISION

MOLDING PROCESS

To Get the Full Benefit From Your CO_2 Process . . .

CARDOX® CO_2

in any form, in any quantity

Bulk liquid carbon dioxide — ready for use at your plant — in a Cardox Storage Unit. Cardox provides tank installation, maintenance and up-keep. You pay for nothing except the CO_2 you use under the terms of your "keep full" user contract. Cardox' fleet of trucks and rail tank cars operating from over 60 plants and depots assure reliable CO_2 supply. Cardox CO_2 cylinder gas, dry ice and converters also available.

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CHEMETRON

DIVISION OF CHEMETRON CORPORATION
Dept. 436, 840 N. Michigan Ave., Chicago 11, Illinois

CARDOX PRODUCTS: Carbon Dioxide Fire Extinguishing Systems, Trucks, and Foam Fire Equipment · Liquid Carbon Dioxide · Carbonic Gas · Dry Ice.

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840 N. Michigan Ave. • Chicago 11, Illinois

Please send me a copy of your CO_2 Foundry Process booklet.

Name_____

Company_____

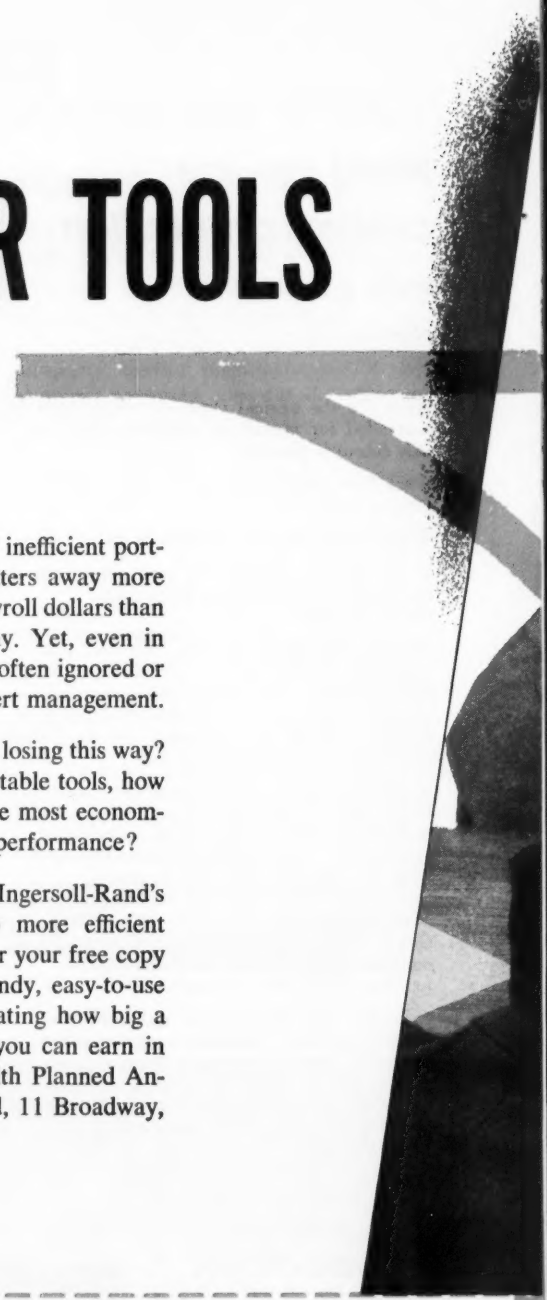
Address_____ City_____ State_____

Circle 581 on Page 53

if you use

PORTABLE POWER TOOLS

...you need these



Studies show that operation of inefficient portable power tools probably fritters away more production . . . wastes more payroll dollars than anything else in industry today. Yet, even in the best-run plants, this fact is often ignored or overlooked by an otherwise-alert management.

How much production are *you* losing this way? Just how efficient are your portable tools, how do you find out, and what's the most economical way to keep them at peak performance?

You can get all the answers in Ingersoll-Rand's new illustrated guidebook to more efficient power tool operation. Write for your free copy today! With it you'll get a handy, easy-to-use *Dividend Computer* for estimating how big a Dividend on Payroll Dollars you can earn in your plant in just one year with Planned Annual Retooling. Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

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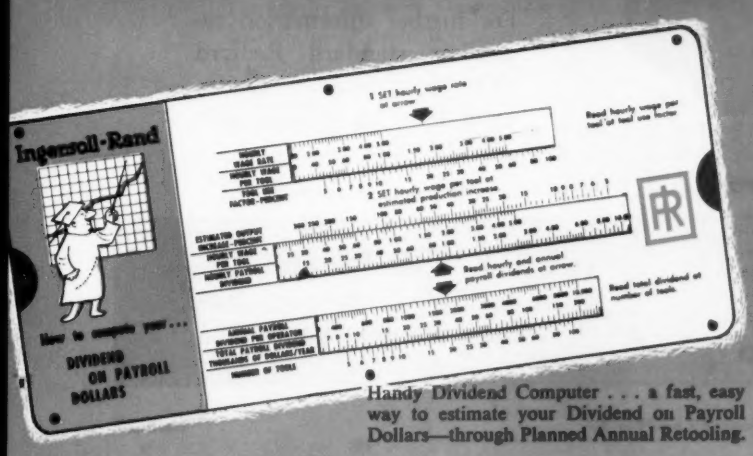
Planned Annual Retooling increases output per man

40A-8

Circle 582 on Page 53

FREE!

how Planned Annual Retooling earns you a dividend on payroll dollars



Handy Dividend Computer . . . a fast, easy way to estimate your Dividend on Payroll Dollars—through Planned Annual Retooling.

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New York 4, N. Y.

Send a copy of new guidebook *"How Planned Annual Retooling Earns You a Dividend on Payroll Dollars"* and a *Dividend Computer* to:

Name_____ Title_____

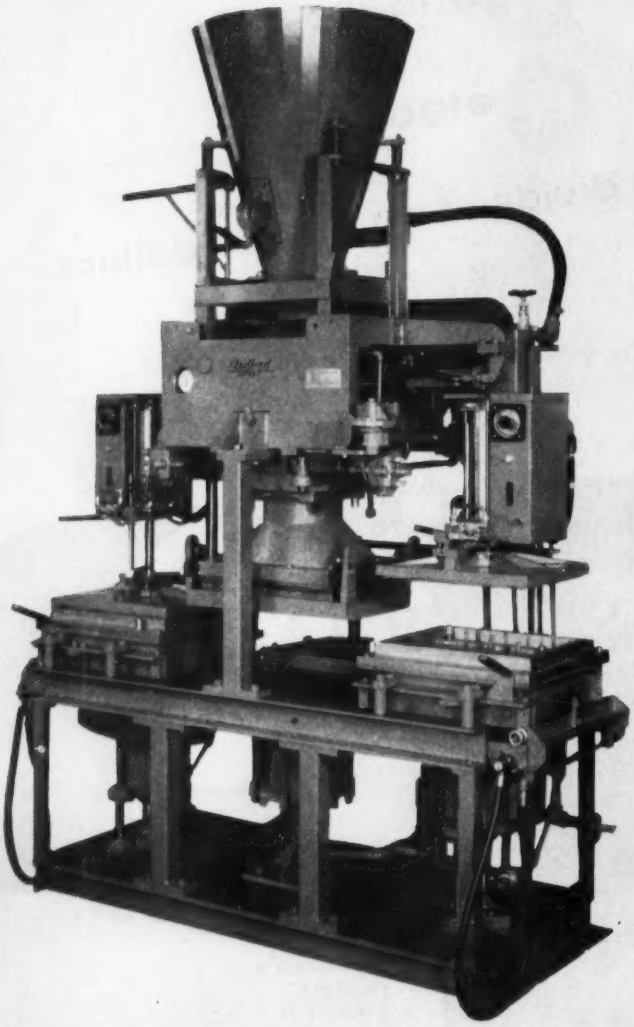
Company_____

Street_____

City_____ Zone____ State_____

Redford

MODEL NO. D-5-H CO_2 MOLD MAKING MACHINE



A proven CO_2 Molding Machine that combines one blow and squeeze and two gassing and stripping stations into one unit for easier handling of mold patterns. Patterns are mounted on carriages which are moved manually from blowing to gassing position. Squeeze plate travel is air operated. The squeeze operation is used to increase mold density and produce perfectly flat molds that can be stacked for pouring.

Electrical reset timers control the automatic gassing and stripping cycle. Maximum standard mold size is 12 x 14 in. and thickness of half molds may vary from ¾ to 2½ in. Up to 90 complete molds-cope and drag-per hour are produced by one operator.

For further information regarding standard Redford CO_2 Mold Making Equipment write for Bulletin 421.

REDFORD IRON & EQUIPMENT CO.

20733 Glendale - Detroit 23, Mich.

Phone: KEnwood 1-8611

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Perfectly balanced

for maximum efficiency...*Vancoram Graphidox*

The ideally balanced composition of Graphidox makes it a highly effective alloy for the supplementary deoxidation of steels. It is especially adaptable in foundry steels where control of grain boundary inclusions is essential.

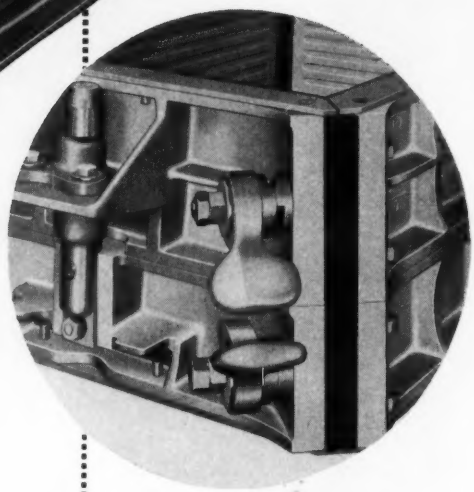
Graphidox, a carefully proportioned alloy of silicon, titanium and calcium, is particularly effective in combination with aluminum where strong deoxidation is required. The dispersement of the non-metallics through efficient use of the calcium contributes to the increased yield strength of the steel.

In addition, Graphidox increases strength without material loss of ductility, increases fluidity, and improves machinability. VCA's technical staff is ready to help you. Just write or call our nearest District Office. Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

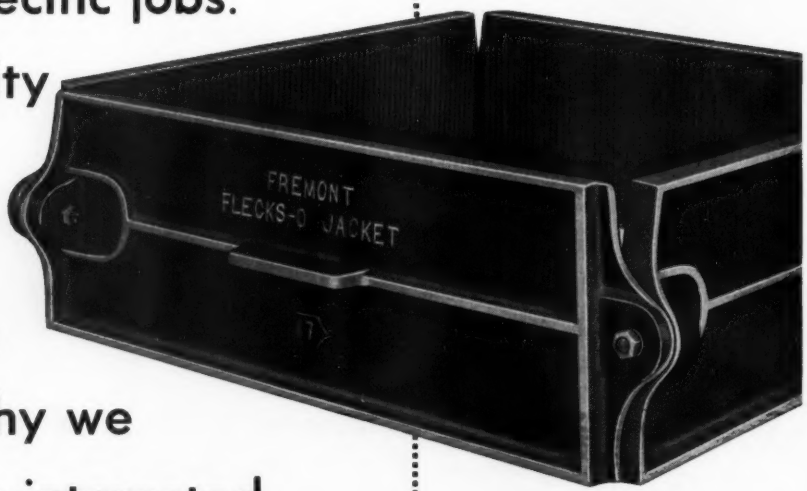
VANADIUM
CORPORATION OF AMERICA
Producers of alloys, metals and chemicals

VANCORAM

Circle 584 on Page 53



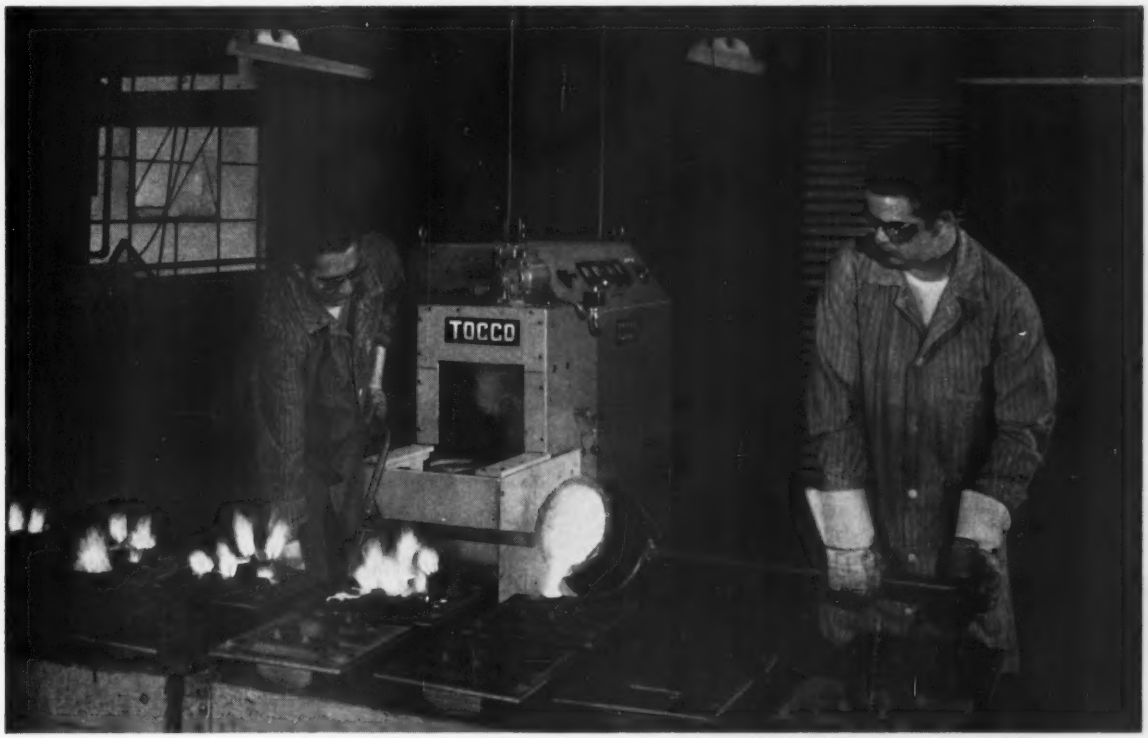
Fremont's Standard Jackets and Flexible Jackets and Spreadlock Flasks are all built to do specific jobs. Their popularity depends on how well they do these jobs. That's why we are extremely interested in their performance at all times.



Fremont flasks are light in weight, easy to handle, accurately machined and sturdily made. They are available in 3°, 4°, or 5° taper.

The Fremont Flask Co., Fremont, O.

Circle 585 on Page 53



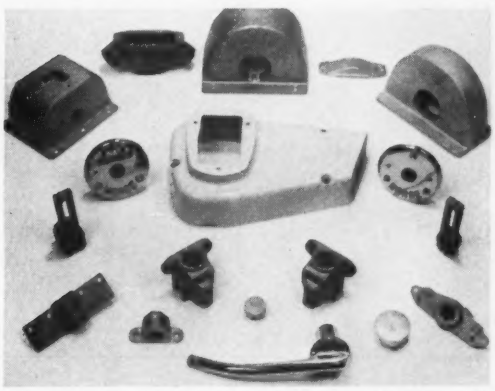
TOCCO* Induction Heating

melts bronze, aluminum and stainless steel for high-precision, porous-free castings

Morse Instrument Company, Hudson, Ohio, manufacturer of marine hardware and control instruments, recently switched from conventional furnaces to TOCCO Induction Melting. Results: greater speed, better working conditions and, above all, purer, sounder castings.

"Castings are free from porosity since we switched to TOCCO Induction Melting," reports president John Morse. "This is a sales advantage to us and a tremendous quality advantage for our customers."

Whether you're interested in melting ferrous or nonferrous metals, TOCCO Induction Melting offers you these important advantages:



Sample castings produced by Morse Instrument Company with new shell molding process and TOCCO Induction Melting.

- **Stepless Power Control**
- **Extremely Rapid Melting**
- **High Efficiency—Even on Intermittent Operation**
- **Good mixing because of Natural Agitation**
- **Extremely Low Alloy Loss**
- **No Contamination when Composition of Charges is Changed**
- **High Reproducibility of Results**
- **Minimum Space Requirements**
- **No Special Installation Charge**
- **Simple, Safe Operation**
- **Clean, Comfortable Working Conditions**
- **No Carbon Pick-up**

If any of these advantages suggest economies in your operations, write for full details—no obligation, of course.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today—**NEW FREE Bulletin**

The Ohio Crankshaft Co. • Dept. F-6, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting".

Name_____

Position_____

Company_____

Address_____

City_____ **Zone**____ **State**_____

Circle 586 on Page 53

How Bob Yochum solved 4 major grinding problems

It's easy enough to formulate a grinding wheel that will cut magnesium fast. But it's likely to leave a surface you could use for a nail file. And, when you formulate specially for fine finish, you're liable to get a wheel that loads up and glazes over like a skating rink. Then, if you concentrate on the glazing problem, you have to worry about the effect of excessive wheel wear.

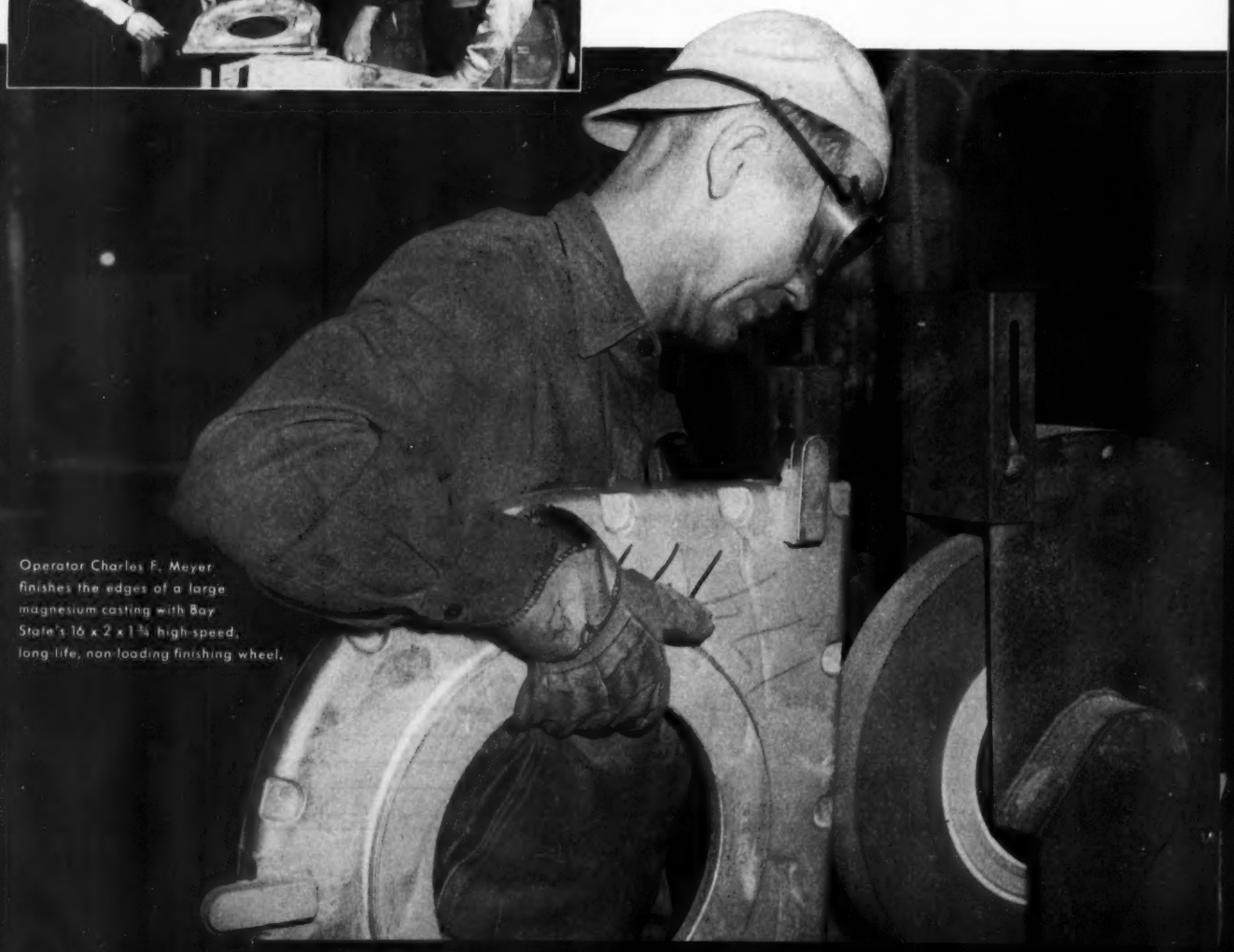
Until recently, all these problems had at some time or another plagued the people at General Magnesium Foundry in St. Louis. Consequently, they were hopeful rather than expectant when they gave Bay State's Bob Yochum the job of working out a solution that would solve as many of them as possible.

Yochum put his extensive knowledge of metallurgy to work and spent a considerable amount of time at the foundry itself, studying every operation. Then he sent a detailed report of his findings and recommendations to Bay State's engineering staff in Westboro . . . and very shortly, General Magnesium had wheels for testing.

The results were more than satisfactory. The new wheels not only cut fast but, at 9,000 s.f.p.m., produced a 250 micro-inch finish **(rms)** on aluminum *and* magnesium castings of aircraft quality. They did not load and they lasted appreciably longer than the wheels they replaced.

This success story is typical of the way Bay State applies imaginative engineering to painstaking analysis of a specific problem. Your own Bay State distributor or direct representative is trained and equipped to do the same kind of job for you. *Better grinding at lower cost . . . that is his business.*

Examining a finished magnesium casting are (left to right) Jim Fischer, Manufacturing V. P. at General Magnesium, Bob Yochum of Bay State, Mel Belton, Plant Supervisor, and Ray Schneidewind, Quality Control.



Operator Charles F. Meyer finishes the edges of a large magnesium casting with Bay State's 16 x 2 x 1¾ high-speed, long-life, non-loading finishing wheel.

with 1 wheel for General Magnesium

After getting his engineering degree from the University of Missouri School of Mines & Metallurgy, Robert J. Yochum spent 6 years in the ship-building industry where he acquired a knowledge of metal-working techniques that was both extensive and intensive. Five years with Bay State have broadened his experience throughout the metal-working industries in general and given him a highly concentrated background in abrasive problems in particular.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

Circle 587 on Page 53

Our 75th year

CHAPTER TWO

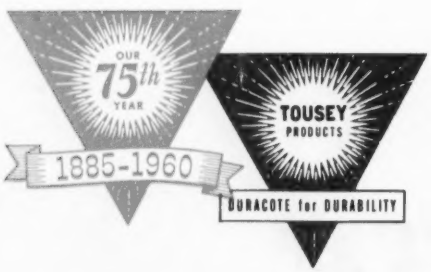
The development of the Tousey Varnish Company into a full-line paint company marks the second phase of its 75 year history. Here was an enterprising organization producing quality finishes, growing rapidly in the expanding economy of the country, paying strict heed to manufacturing standards and offering every possible advantage to customers, both old and new.

This building of the company to a position of substance in the industry rested largely with one man, William R. Alcorn, who joined the organization in 1908 and was elected president in 1924. Mr Alcorn's business acumen led him to direct the company's primary sales efforts to the field of agriculture where manufacturers of equipment and machinery were expanding at an unbelievable rate. Tousey's fine weather-resistant finishes were well received and became the standard of quality for many companies, most of which are large users of these products today.

To handle the greatly increased volume, Tousey added several building to the already substantial looking establishment. New equipment was purchased, installed and put to use as rapidly as possible. Three laboratories were added, being staffed with technical directors and ample help. Raw material control was set up, research for new products was expanded and a vigilant eye was kept on the day to day output of finishes to insure quality products.

Individual attention to consumer's needs, dedication to the manufacturing of quality products and a sincere effort to maintain these standards continued to be Tousey's formula for expansion during the second period of its history.

(to be continued)



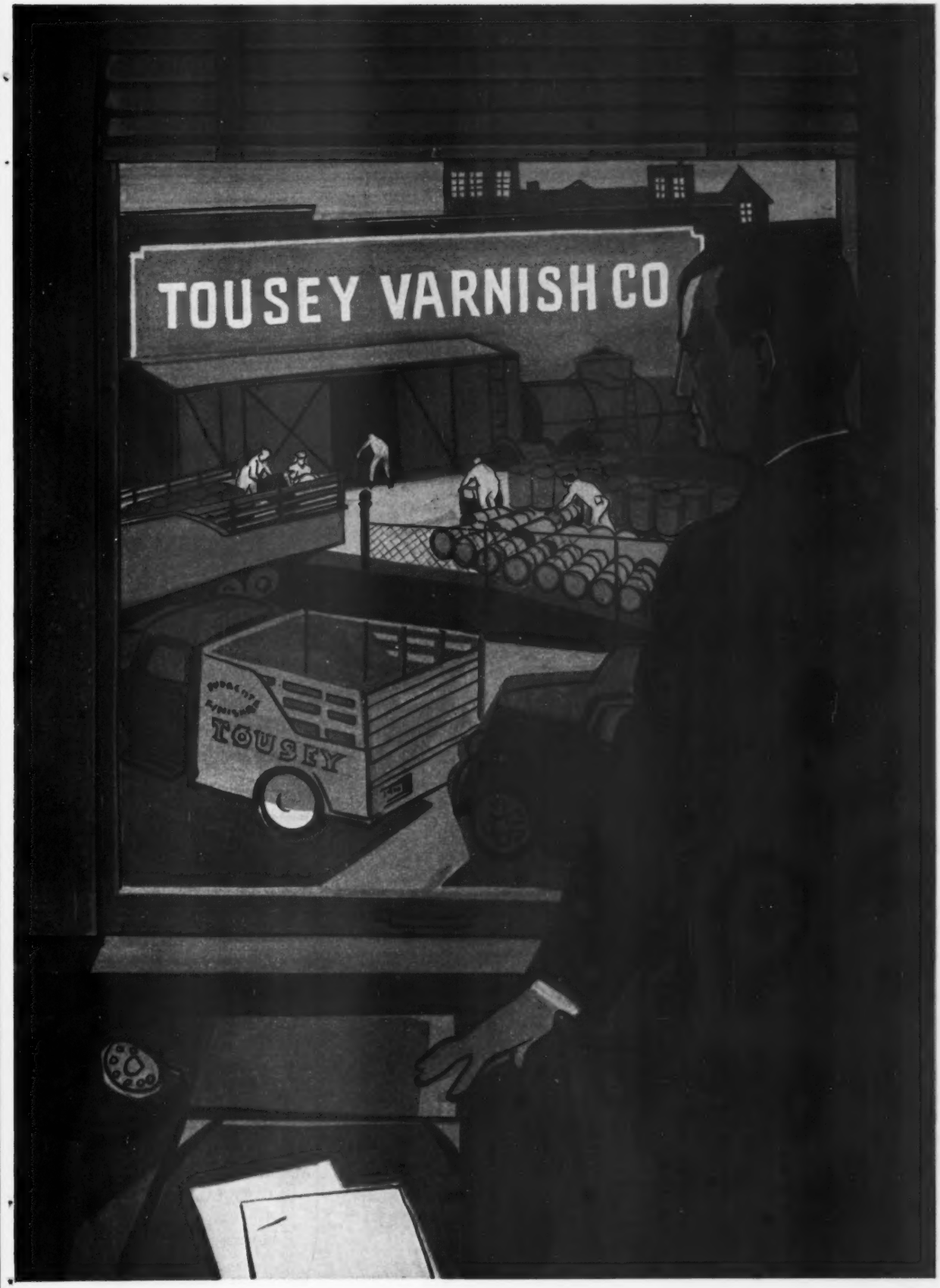
Tousey Varnish Company manufactures a full line of finishes for application by Dipping, Flo-coating, Hot Dipping, Automatic Spray, Electrostatic Spray, Airless and Hot Spray. Tousey is a major supplier of finishes to manufacturers of Farm Machinery, Road and Construction Machinery, Automobiles and Trucks, and to other representative manufacturers of products made of metal.

TOUSEY VARNISH COMPANY

Chicago Division: 520 WEST TWENTY-FIFTH STREET • CHICAGO 16, ILLINOIS • Victory 2-2200

Quad-Cities Division: 2500 EIGHTH AVENUE • EAST MOLINE, ILLINOIS • PHONE 35295

Circle 588 on Page 53

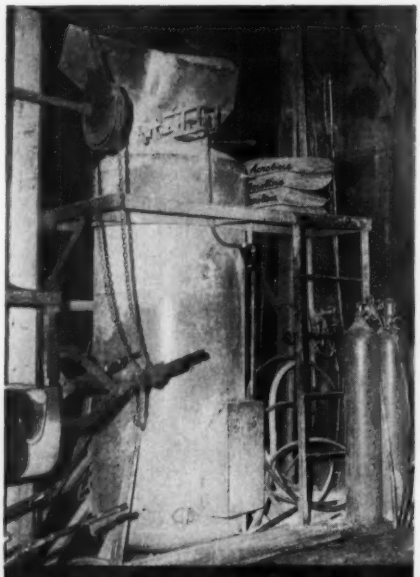

TOUSEY VARNISH CO
TOUSEY

This Ridley Gun Saved $3000 the First Year!

Cupola Patches made in 1/2 the Time!

Installed at American Brass and Iron's Oakland plant in January of 1959, this Ridley R-1A-60 Gun saved more than $3,000.00 the first year alone. Actually paid for itself in one year's operation.

This Ridley Gun will cut your cupola patching and maintenance costs because it is without question the most efficient gun ever designed for shooting refractory materials.



R-1 Custom Series

Here's why:

- Save labor—one man operation from start to finish.
- Nozzle control for all material, water and air.
- Extremely safe—man in furnace has complete control.
- Unsurpassed steadiness of flow—no fluctuation of pressures, density or wetness of patch.
- Uniform pressure from start to finish.
- Low maintenance costs—as low as $24.00 per year including expendables.

Write today for complete information and specifications.

Ridley and Company, Inc.

2217 Pontius Avenue
Los Angeles 64, California

"One Man, One Gun, One Load Shoots Entire Job"

READING TIME: 55 seconds

Can you spare 55 seconds to learn of something that may save you thousands of dollars?

The Story of Alabama – *High Silica* – Refractory Clay

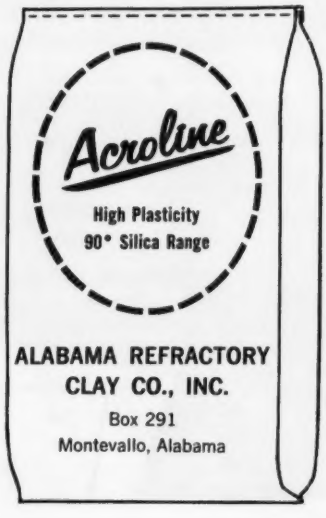
In some long-past geological age, Nature laid down across the state of Alabama a series of bowls filled with the most unusual clay; it is unusual because of two characteristics: (1) it is very high in plasticity, and, (2) its silica content is in the 90% range.

Since clay is a very useful product around foundries, it was inevitable that sooner or later some foundryman would discover that this clay was unsurpassed as a liner for cupola melting zones, ladles, runners, etc. For many years foundrymen used this clay in a plastic form—hand-packing it where needed.

Then came refractory guns for air-ramming granular mixes of refractory materials. Again it was inevitable that some enterprising foundryman would take some of this Alabama clay, crush it manually, and shoot it through a gun. Once more the results were terrific... even more spectacular than the hand-packed material. The first Alabama Clay was shot through a gun in 1953. Since that time Alabama Clay has spread over the country almost entirely by word-of-mouth as one foundryman told another of his phenomenal cupola and ladle operation. If you are looking for lower per ton refractory costs and much, much better cupola operation, investigate ALABAMA CLAY!!!!

write for free folder

ALABAMA REFRACTORY CLAY CO., INC.
Box 291, Montevallo, Alabama



Removing risers from these big, unwieldy aluminum castings is a fast, low-cost job with the DoALL Zephyr band machine. Cuts are made in seconds safely and with fine finish here at the Ross Pattern & Foundry Development Co. of Sidney, Ohio.

How DoALL Band Saws Can Help You Cut Foundry Costs

Whether your castings are large or small, simple or complex, ferrous or nonferrous, DoALL has the equipment and the experience to save you both time and money.

For example, Ross Pattern & Foundry Development Co. uses a DoALL Zephyr band machine with a ⅝", 3-pitch blade to cut 2" x 4" risers from these 20" x 48" castings of 108 aluminum. And note the accessibility band sawing offers.

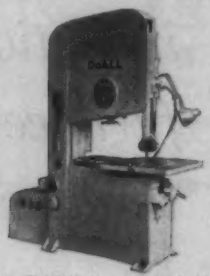
Foundries all over America are using DoALL band machines to cut off gates, risers and flash. These versatile machines also handle many other money-making jobs: slitting, slotting, splitting, notching, beveling, etc. Results: lower production costs, faster deliveries.

DoALL band machines and blades are designed to work together as a high-production team. And they're distributed by a single source that guarantees service and results.

Your nearby DoALL Sawing Specialist understands foundry problems. His experience and the services of the DoALL Research Laboratory are yours for the asking—free. Call your DoALL store today.

B-59

Assisting on this job was Meredith L. Cline of DoALL Dayton Co. He is one of over 200 DoALL Sawing Specialists ready to help foundries achieve higher production at lower costs. Their expert help is free.



The ZEPHYR is a rugged, high-tool velocity sawing machine for production cutting of nonferrous materials and friction sawing.

The UTILITY MACHINE is a low-cost, versatile band saw for general shop use.

DoALL SAW Bands—to saw every metal and material. Over 300 width-pitch-set combinations; 18 styles in both carbon and high-speed steel . . . also file bands, grinding bands and polishing bands. The DoALL friction saw blade is the finest the industry has ever produced!

THIS IS A TYPICAL DoALL STORE

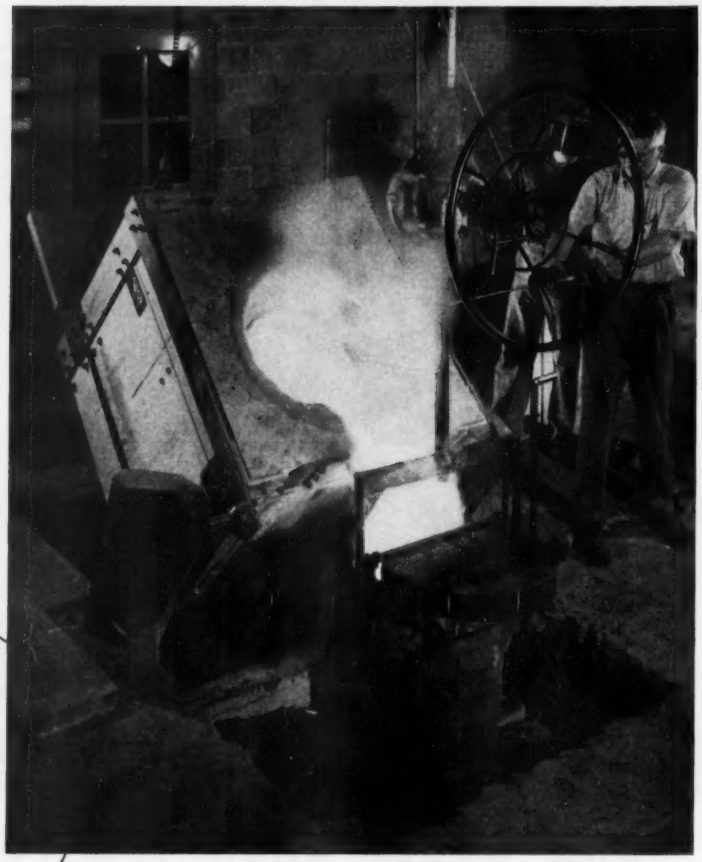
The DoALL Company, Des Plaines, Illinois

Circle 590 on Page 53

WITH TAYLOR ZIRCON RAMMING MIX

Mould Manufacturer cuts induction furnace lining costs by

50%



Pouring a heat of grey iron from 650 lb. high frequency induction furnace lined with TAYLOR ZIRCON No. 717 Ramming Mix.

TAYLOR ZIRCON No. 717 Ramming Mix has cut refractory lining costs *in half* for a mid-west mould manufacturer. In addition, average number of heats has increased. This company melts grey iron in 650 lb. and 1000 lb. induction furnaces to produce moulds for the glass industry.

Alert foundries are standardizing on TAYLOR ZIRCON Ramming Mix as the most economical lining for high frequency furnaces. High softening point, low thermal conductivity, high di-electric strength, and volume stability make TAYLOR ZIRCON an excellent refractory for this service. For detailed information, write direct, or call in a Taylor field engineer.

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
Oakville, Ont., and Montreal

The CHAS. TAYLOR SONS Co.
A SUBSIDIARY OF NATIONAL LEAD COMPANY
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Circle 591 on Page 53

Use These Cards . . .

FOUNDRY

- For more information on anything advertised in this issue
- For further data on products described in the Equipment and Supplies section (Page 145)
- To get copies of publications listed in the Literature for Foundrymen section (Page 194)
- To request extra copies of editorial articles

FOUNDRY — JUNE 1960

401	431	461	491	521	551	581	611	641	671	701	731	761	791	821	851
402	432	462	492	522	552	582	612	642	672	702	732	762	792	822	852
403	433	463	493	523	553	583	613	643	673	703	733	763	793	823	853
404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854
405	435	465	495	525	555	585	615	645	675	705	735	765	795	825	855
406	436	466	496	526	556	586	616	646	676	706	736	766	796	826	856
407	437	467	497	527	557	587	617	647	677	707	737	767	797	827	857
408	438	468	498	528	558	588	618	648	678	708	738	768	798	828	858
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410	440	470	500	530	560	590	620	650	680	710	740	770	800	830	860
411	441	471	501	531	561	591	621	651	681	711	741	771	801	831	861
412	442	472	502	532	562	592	622	652	682	712	742	772	802	832	862
413	443	473	503	533	563	593	623	653	683	713	743	773	803	833	863
414	444	474	504	534	564	594	624	654	684	714	744	774	804	834	864
415	445	475	505	535	565	595	625	655	685	715	745	775	805	835	865
416	446	476	506	536	566	596	626	656	686	716	746	776	806	836	866
417	447	477	507	537	567	597	627	657	687	717	747	777	807	837	867
418	448	478	508	538	568	598	628	658	688	718	748	778	808	838	868
419	449	479	509	539	569	599	629	659	689	719	749	779	809	839	869
420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870
421	451	481	511	541	571	601	631	661	691	721	751	781	811	841	871
422	452	482	512	542	572	602	632	662	692	722	752	782	812	842	872
423	453	483	513	543	573	603	633	663	693	723	753	783	813	843	873
424	454	484	514	544	574	604	634	664	694	724	754	784	814	844	874
425	455	485	515	545	575	605	635	665	695	725	755	785	815	845	875
426	456	486	516	546	576	606	636	666	696	726	756	786	816	846	876
427	457	487	517	547	577	607	637	667	697	727	757	787	817	847	877
428	458	488	518	548	578	608	638	668	698	728	758	788	818	848	878
429	459	489	519	549	579	609	639	669	699	729	759	789	819	849	879
430	460	490	520	550	580	610	640	670	700	730	760	790	820	850	880

SEND COPIES OF FOLLOWING ARTICLES IN THIS ISSUE

Page No. — Title of Article

....

....

Circle item number for further information on anything described or advertised in this issue

CARD INVALID WITHOUT COMPANY NAME—TYPE OR PRINT

NAME _____

TITLE _____

COMPANY _____

PRODUCT MANUFACTURED _____

ADDRESS _____

CITY _____ ZONE _____

STATE _____

This card good until Aug. 15, 1960

FOUNDRY — JUNE 1960

401	431	461	491	521	551	581	611	641	671	701	731	761	791	821	851
402	432	462	492	522	552	582	612	642	672	702	732	762	792	822	852
403	433	463	493	523	553	583	613	643	673	703	733	763	793	823	853
404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854
405	435	465	495	525	555	585	615	645	675	705	735	765	795	825	855
406	436	466	496	526	556	586	616	646	676	706	736	766	796	826	856
407	437	467	497	527	557	587	617	647	677	707	737	767	797	827	857
408	438	468	498	528	558	588	618	648	678	708	738	768	798	828	858
409	439	469	499	529	559	589	619	649	679	709	739	769	799	829	859
410	440	470	500	530	560	590	620	650	680	710	740	770	800	830	860
411	441	471	501	531	561	591	621	651	681	711	741	771	801	831	861
412	442	472	502	532	562	592	622	652	682	712	742	772	802	832	862
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414	444	474	504	534	564	594	624	654	684	714	744	774	804	834	864
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417	447	477	507	537	567	597	627	657	687	717	747	777	807	837	867
418	448	478	508	538	568	598	628	658	688	718	748	778	808	838	868
419	449	479	509	539	569	599	629	659	689	719	749	779	809	839	869
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426	456	486	516	546	576	606	636	666	696	726	756	786	816	846	876
427	457	487	517	547	577	607	637	667	697	727	757	787	817	847	877
428	458	488	518	548	578	608	638	668	698	728	758	788	818	848	878
429	459	489	519	549	579	609	639	669	699	729	759	789	819	849	879
430	460	490	520	550	580	610	640	670	700	730	760	790	820	850	880

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FOUNDRY

Reader Information Service

Just mail one of these cards . . . for more information on anything advertised in this issue . . . for further data on products described in the Equipment and Supplies section (Page 145) . . . to get copies of publications listed in the Literature for Foundrymen section (Page 194) . . . to request extra copies of editorial articles.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States
—POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States
—POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Reader's Service Dept.

RESTORE COSTLY COPPER COMPONENTS TO FULL EFFICIENCY at a fraction of replacement cost

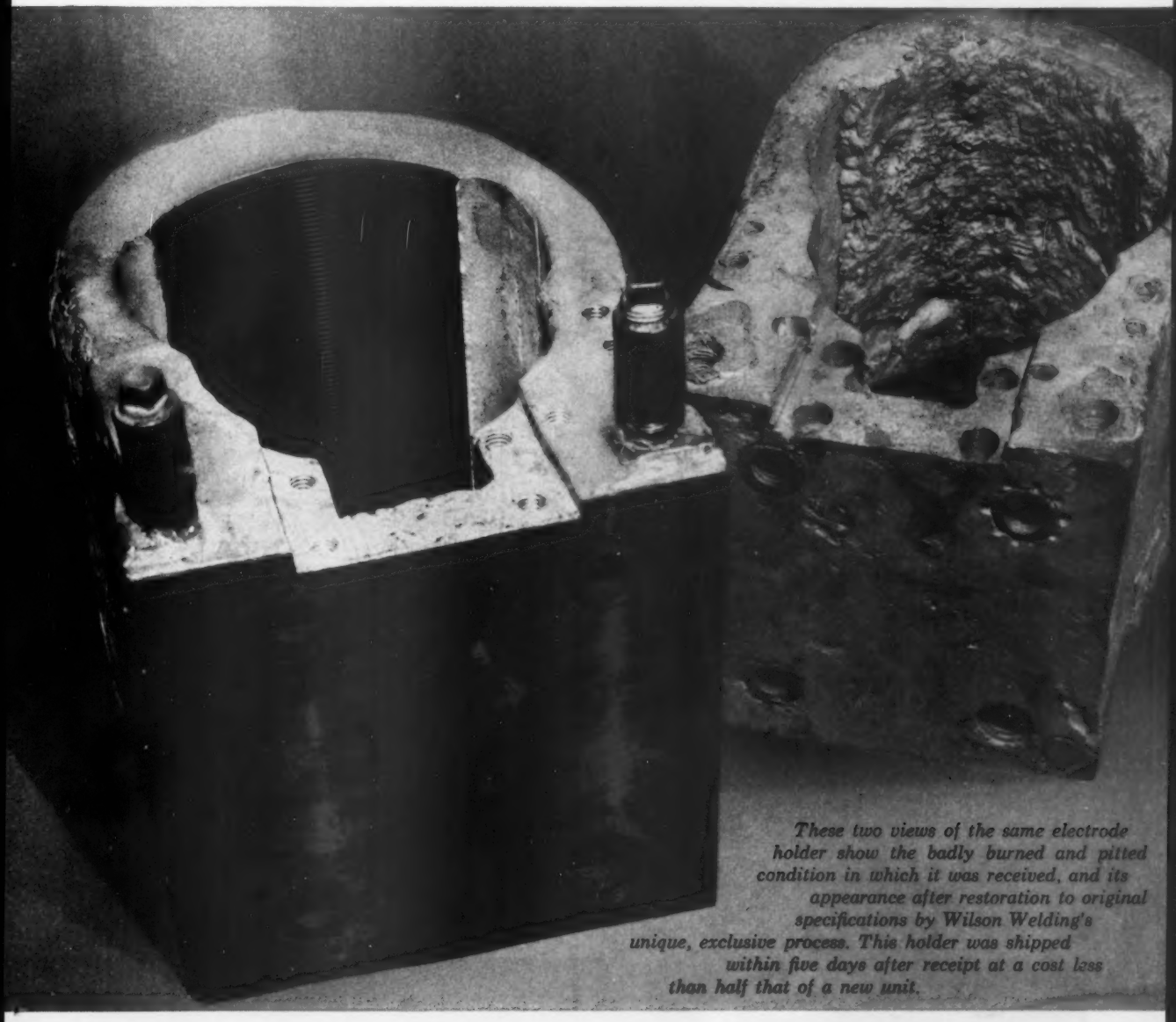
ELECTRODE HOLDERS, BUS TUBES, CABLE CLAMPS, TUYERES

Foundry operators throughout the industry are saving literally thousands of dollars by taking advantage of Wilson Welding Company's patented process for rebuilding costly copper electrode holders, bus tubes, cable clamps and tuyeres.

After being restored to original specifications, or modified to meet your requirements, such items are guaranteed to perform and give life expectancy equal to that of new units and at substantial savings. Repair prices are based upon the amount of labor and material cost involved and rarely equal 50 per cent of replacement cost.

Prompt service reduces costly down time. Ordinarily jobs are completed and shipped within five days after receipt. In emergencies this service can be accelerated to meet your requirements.

Don't discard or scrap badly burned, pitted or scarred units. They are costly and can be salvaged. Write or call Wilson Welding Company, Inc. for cost estimate or additional information without obligation.



These two views of the same electrode holder show the badly burned and pitted condition in which it was received, and its appearance after restoration to original specifications by Wilson Welding's unique, exclusive process. This holder was shipped within five days after receipt at a cost less than half that of a new unit.

WILSON WELDING COMPANY, INC.

COPPER AND COPPER ALLOY WELDING

Now serving 200 steel mills and foundries throughout the United States and Canada

WW COMPANY INC.

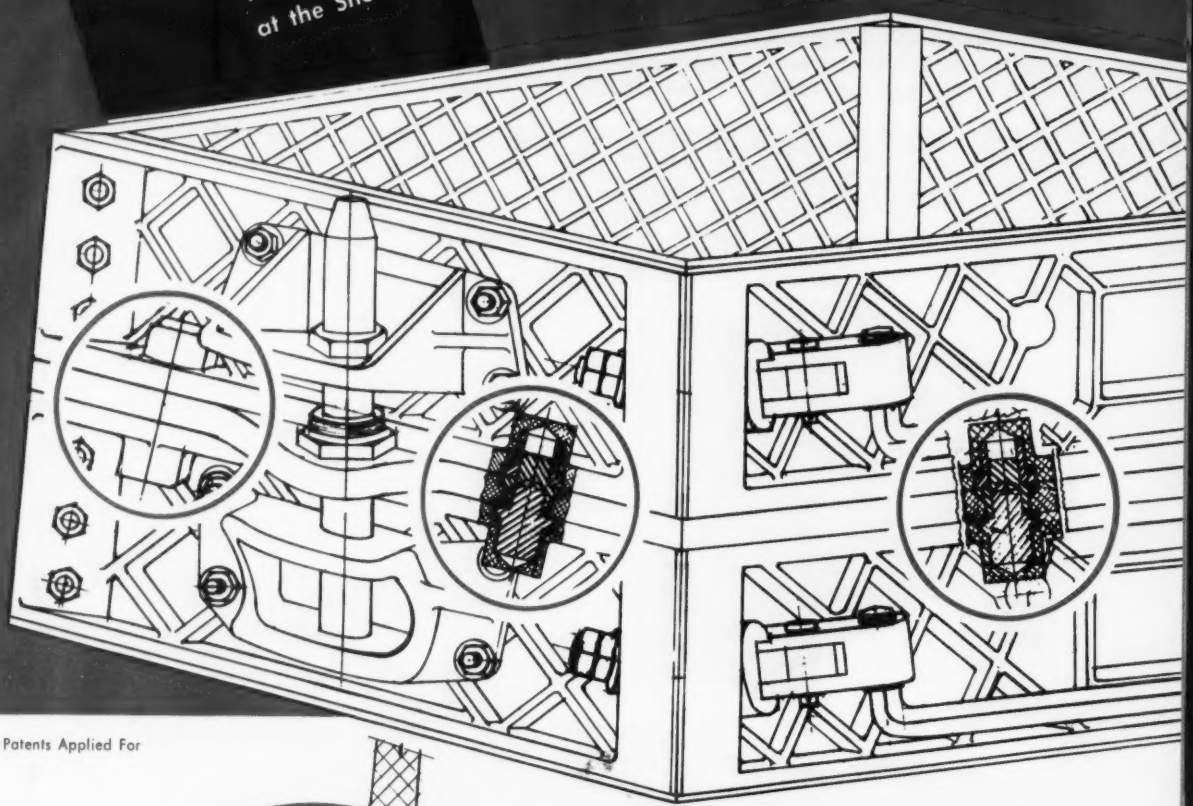
P. O. BOX 1634
221 HIGH STREET
ALTIZER ADDITION
HUNTINGTON, W. VA.
JACKSON 3-6281

Circle 592 on Page 53

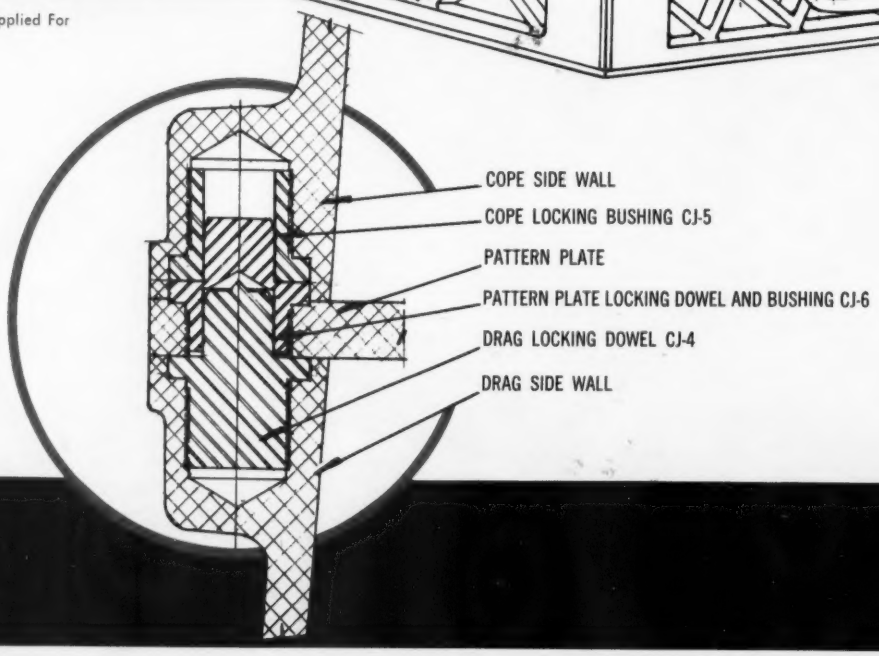
HERE'S THE "NEW

One of many HINES developments contributing to better foundry production

if you didn't see them in the HINES Booth at the Show . . .

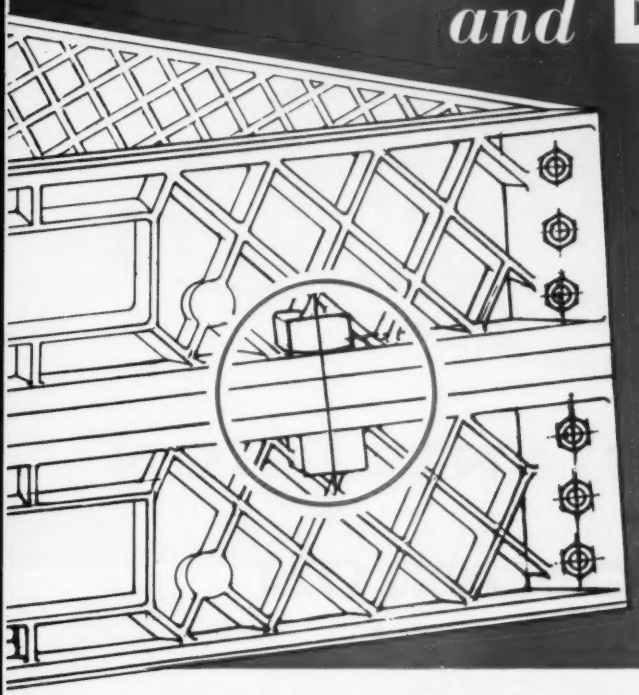


Patents Applied For



FEATURE" ON HINES FLASKS...

LOCKING DOWELS *and* BUSHINGS



Again HINES comes up with a new "development contributing to better foundry production"! This time, it's a comparatively simple, but ingenious dowel-bushing arrangement installed in cope, pattern plate and drag, to prevent flask walls from spreading when under heavy squeeze pressure. In effect, these assemblies, eight to the average size flask, "lock" cope and drag walls to the pattern plate (and to each other, after plate is removed) to prevent flask deformation. When flask corners are "popped-open" (after pattern plate is removed), cope and drag walls open as a unit, to eliminate strain on flask pins and bushings. Flask is always "in line"—when in use, in storage or when being moved.

- Made for use with 3/8", 5/8" and 1/2" thick pattern match plates.
- Made with small diameter dowels for use with flasks with 1" and 1¼" flanges — and with larger dowels for use on flasks with 1½" and 2" flanges.
- When installed, dowels and bushings are completely enclosed — sand cannot penetrate assemblies to hamper their efficient operation.
- Locking dowel CJ-4 has "center-punch" head for locating hole centers when drilling pattern plate, for installation of CJ-6 dowels and bushings.

Complete data sheets available, as requested.

HINES POP-OFF FLASK — FEMA

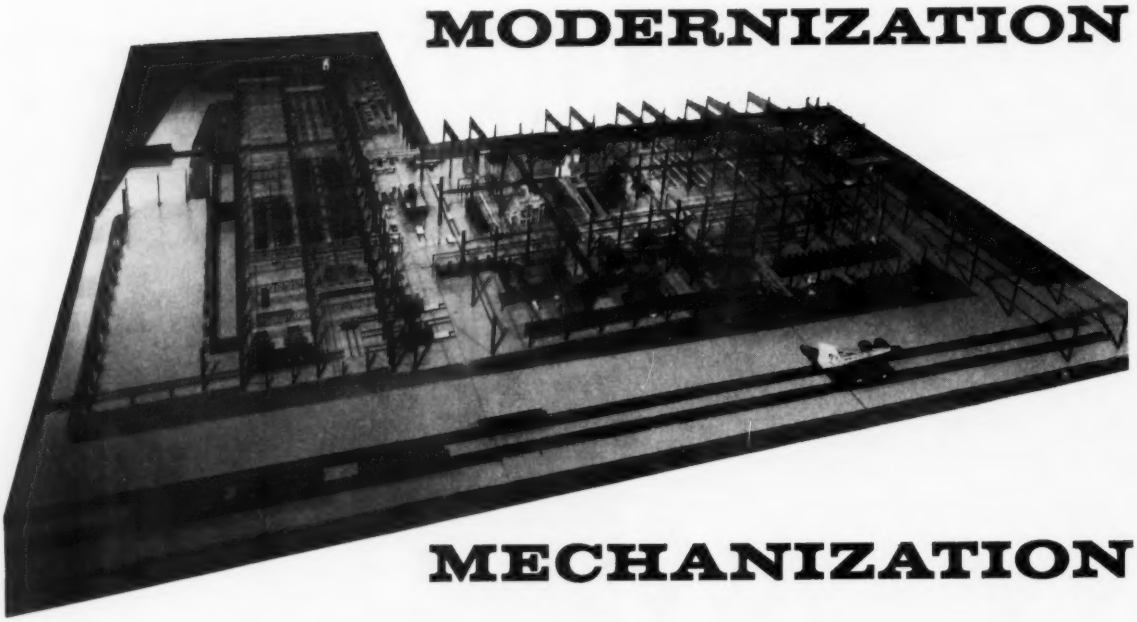
THE HINES FLASK CO.

3431 WEST 140th ST. • CLEVELAND 11, OHIO • PHONE: ORCHARD 1-2806

Circle 593 on Page 53

A timely message for foundry managements

MODERNIZATION



MECHANIZATION

AUTOMATION

This model, a proposed modernization of a steel foundry producing railroad, armor and commercial castings, is an example of Knight professional foundry engineering. Operations are automated, semi-automated and mechanized to provide, insofar as is practicable, a flow of material through the plant with minimum handling, except when an operation is performed. Production per man hour has been increased, more flexibility has been provided, control of quality and delivery has been improved, plus the opportunity for lower operating costs.

This program resulted from a survey by Knight Engineers working with client personnel to determine, for this problem, the most modern technological improvements and new materials, methods and controls that could be economically justified.

KNIGHT SERVICES INCLUDE:

Foundry Engineering • Architectural Engineering • Construction Management • Modernization • Mechanization • Automation • Survey of Facilities • Materials Handling • Methods Industrial Engineering • Wage Incentives • Cost Control • Standard Costs • Flexible Budgeting Production Control • Organization • Marketing

Lester B. Knight & Associates, Inc.

Management, Industrial and Plant Engineers

Member of the Association of Consulting Management Engineers, Inc.

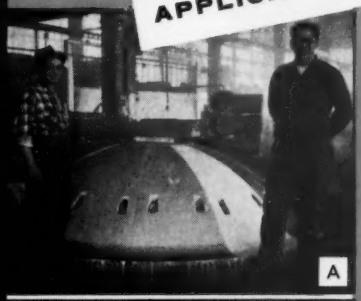
549 W. Randolph St., Chicago 6, Ill.

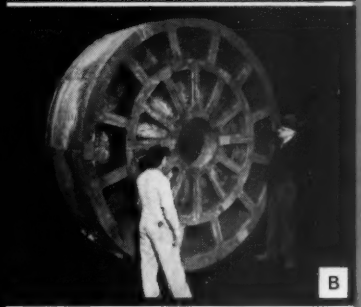
New York Office—Lester B. Knight & Associates, Inc., Management Consultants, 500 Fifth Ave., New York 36
Knight Engineering Establishment (Vaduz), Zurich Branch, Dreikönigstrasse 21, Zurich, Switzerland
Lester B. Knight & Associates, G.M.B.H., Berliner Allee 47, Düsseldorf, Germany

Circle 594 on Page 53

How COMBUSTION ENGINEERING, Inc. Precision-Casts LARGE DIES

KOLD-SET APPLICATION STUDY


A


B

C

- **100% elimination of rough cleaning**
- **dimensional accuracy —¼" over 10'**
- **absolutely no metal penetration**

With *Kold-Set* cores used throughout, over-all cleaning involved only dressing the die face by wire brushing. Shipment was made two days after shakeout.

Combustion Engineering's MONONGAHELA DIVISION achieved such spectacular results in precision-casting dies for forming pressure vessel drum heads (by the CHATTANOOGA DIVISION) that it now competes for heavier type work. Previously the Division had limited itself to a maximum of 20 tons, and now would welcome work up to 40 tons.

	Male Die	Female Die
Pouring Weight	45,000 lb.	84,000 lb.
Shipping Weight	40,000 lb.	80,000 lb.
Width	116"	123½"
Height	35½"	42"
Metal Section on Die Face	6¼"	9"
KOLD-SET SAND		
—Silica	38,400 lb.	36,000 lb.
—Zircon	6,600 lb.	6,000 lb.
Dimensional Accuracy	¼" in 10' Diameter. Closer than 1/64" in 42" Height	
Gating	3 Down Gates, each having 3 In Gates	

May we demonstrate how Kold-Set can improve results and reduce costs in your foundry?

1

2

3

4

5

6

FEMALE DIE:

(A) Kold-Set core (B) Back of die, with 9" metal sections in lightened out area (C) Face of finished die.

MALE DIE:

(1) Mold (2) Segment cores (3) Setting segment cores (4) Pouring (5) Casting at Shakeout (6) Finished Die—wire brushed only

FOR FOUNDRY PRODUCTS PROGRESS

G. E. SMITH, INC.

246 WASHINGTON ROAD • PITTSBURGH 16, PA.

Warehouse Stocks in Boston • Chicago • Philadelphia • Detroit • Indianapolis
San Gabriel, Calif. • Hamilton • Toronto • Montreal

Circle 595 on Page 53

3041-HP

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN PNEUMATIC MACHINE CO.
UNION BANK BUILDING, PITTSBURGH 22, PA.

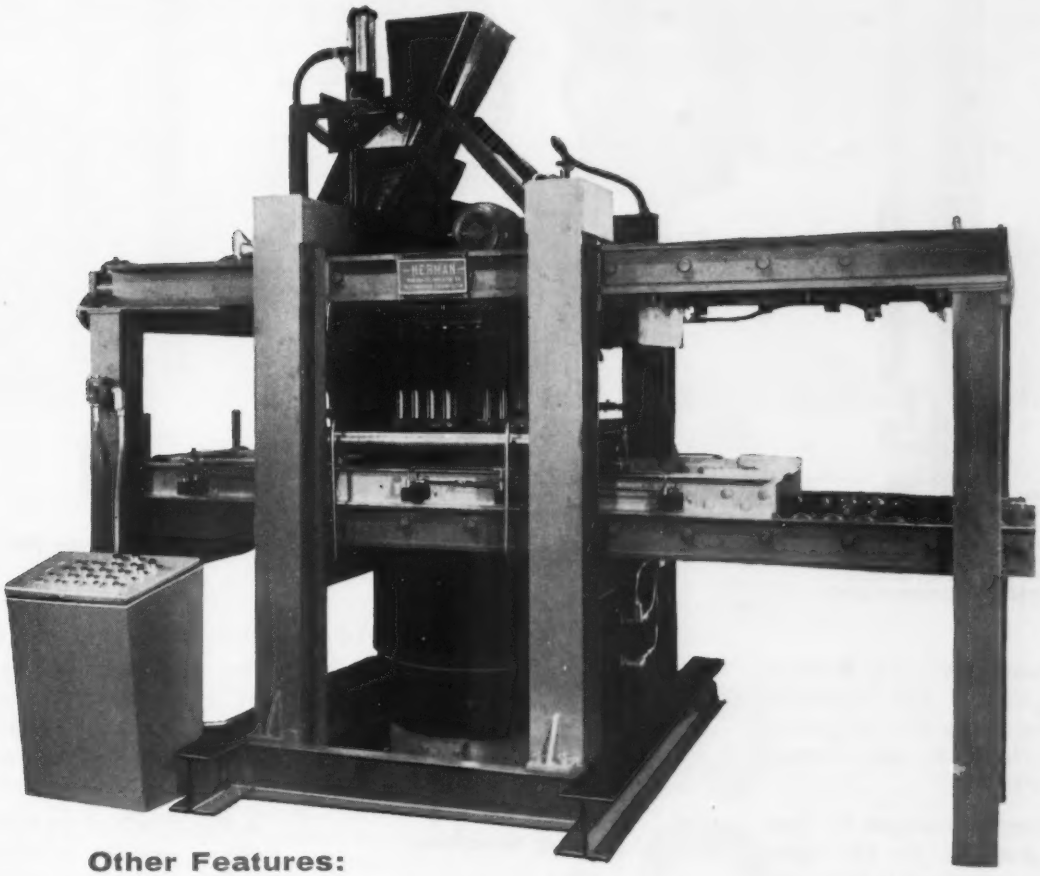
Here is the latest example of Herman quality engineering . . . the Straight-Through Moldmaster you probably saw in Philadelphia, at the A.F.S. Show.

It includes all of the progressive features of the established Herman Moldmaster, except that it's designed for the producer of small molds.

The Straight-Through Machine offers you self-contouring squeeze molding for flasks up to 500 sq. in. in area.

It's an economical, high speed, automatic machine.

Simultaneous cope and drag molding is provided.



Other Features:

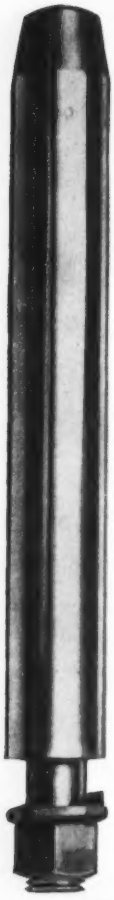
1. Fast, accurate pattern draw-down.
2. Pneumatically-controlled pressure squeeze against hydraulic squeeze feet.
3. Automatic, uniform flask filling into an upset, to minimize spillage.
4. Sand fill takes place during flask charging and the machine strikes off a finished mold automatically.
5. Quick pattern change.

These and other operating features of this particular Herman machine combine to make it a basic machine to fit particular requirements.

Our technical sales engineers near you will gladly supply further details.

Investigate the Straight-Through Moldmaster today.

Circle 596 on Page 53



Adams Round Pin

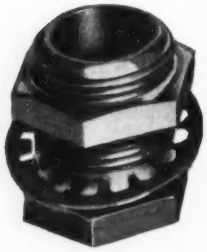
Hardened, Ground,
Hard Chrome Plated

Adams
Round Bushing

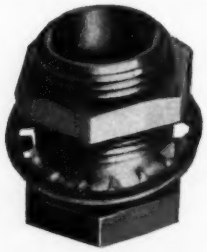
(End View)
Open

Adams
Elongated Bushing

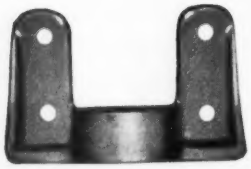
(End View)
Hexagon Pin Inserted



Adams
Round Bushing
Nut and Lock Washer
Long Flask
Short Plate



Adams
Elongated Bushing
Nut and Lock Washer
Long Flask
Short Plate



Adams Hexagon Pin

Hardened, Ground,
Hard Chrome Plated

Adams Pins and Bushings for Cherry and Aluminum Flasks assure you top quality and precision for close tolerance operation.

Proper mountings for pins and bushings for all Cherry Flasks are offered to meet practically all of your requirements.

Adams Pin and Bushing Mountings

(Cast Aluminum)
For Cherry Flasks
For Small Flasks—(Standard)

For New Equipment or as Part Replacement, the same care and accuracy in manufacture helps make the toughest jobs productive.

A wide variety of pin arrangements is included to complete our line. Write us at once for full information.

LET ADAMS HELP YOU ANALYZE YOUR FLASK EQUIPMENT PROBLEMS

The ADAMS Company

ESTABLISHED 1883

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

MOLDING MACHINES and FLASK EQUIPMENT

Circle 597 on Page 53

Combining high strength, corrosion resistance and toughness:

HERCULOY*
SILICON BRONZE CASTING ALLOY

Herculoy is an economical replacement for the costlier high tin content bronzes for many applications. It finishes to a rich golden color. Its strength is comparable to low and medium carbon steels. Its corrosion resistance is comparable to that of pure copper. Herculoy, with extremely low electrical conductivity, is also non-magnetic, easily worked hot, castable without the need for deoxidizing agents during melting. Write or call for new Herculoy literature: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, N. Y. Telephone REctor 2-9500, or call your nearest Federated sales office.

*Patented by Revere Copper and Brass Incorporated; alloyed and marketed exclusively to the casting industry by Federated Metals Division.

Among the thousands of "hardware" products manufactured by the A. B. Chance Company of Centralia, Mo., are eyebolt castings for the electrical industry. These castings require a tough, high strength, corrosion resistant material with low electrical conductivity. Herculoy provided this unique combination of properties.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

FEDERATED METALS DIVISION

Where to call for information:

ALTON, ILLINOIS
Alton: Howard 5-2511
St. Louis: Jackson 4-4040

BALTIMORE, MARYLAND
Orleans 5-2400

BIRMINGHAM, ALA.
Fairfax 2-1802

BOSTON 16, MASS.
Liberty 2-0797

CHICAGO, ILL. (WHITING)
Chicago: Essex 5-5000
Whiting: Whiting 826

CINCINNATI, OHIO
Cherry 1-1678

CLEVELAND, OHIO
Prospect 1-2175

DALLAS, TEXAS
Adams 5-5034

DETROIT 2, MICHIGAN
Trinity 1-5040

EL PASO, TEXAS
(Asarco Mercantile Co.)
3-1852

HOUSTON 29, TEXAS
Orchard 4-7611

LOS ANGELES 23, CALIF.
Angelus 8-4291

MILWAUKEE 10, WIS.
Hilltop 5-7430

MINNEAPOLIS, MINN.
Tuxedo 1-4109

NEWARK, NEW JERSEY
Newark: Mitchell 3-0500
New York: Digby 4-9460

PHILADELPHIA 3, PENNA.
Locust 7-5129

PITTSBURGH 24, PENNA.
Museum 2-2410

PORTLAND 9, OREGON
Capitol 7-1404

ROCHESTER 4, NEW YORK
Locust 5250

ST. LOUIS, MISSOURI
Jackson 4-4040

SALT LAKE CITY 1, UTAH
Empire 4-3601

SAN FRANCISCO 24, CALIF.
Atwater 2-3340

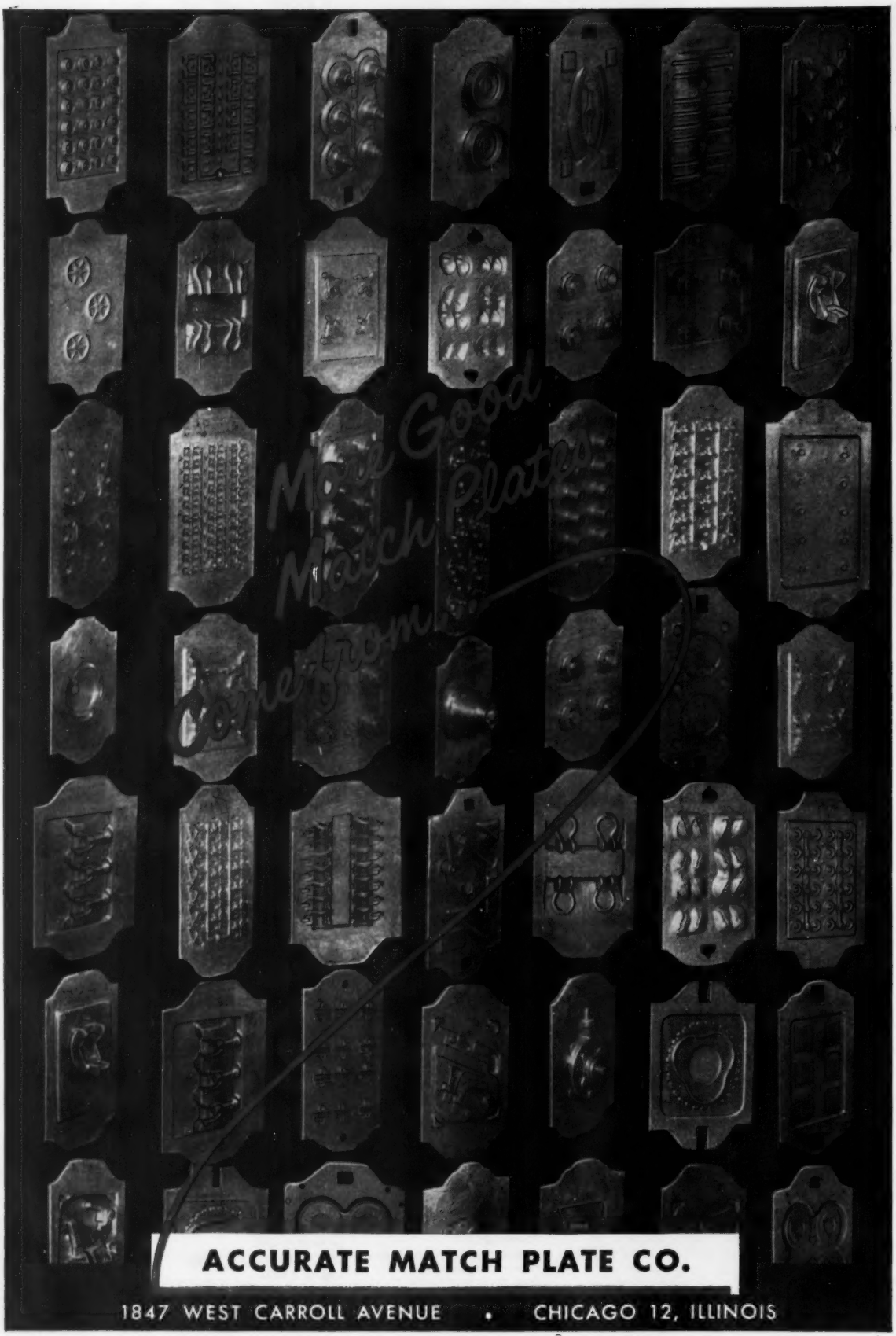
SEATTLE 4, WASHINGTON
Main 3-7160

WHITING, IND. (CHICAGO)
Whiting: Whiting 826
Chicago: Essex 5-5000

IN CANADA: Federated Metals Canada, Ltd.
Toronto, Ont., 1110 Birchmount Rd., Scarborough, Phone: Plymouth 73246

Montreal, P.Q., 1400 Norman St., Lachine, Phone: Melrose 7-3591

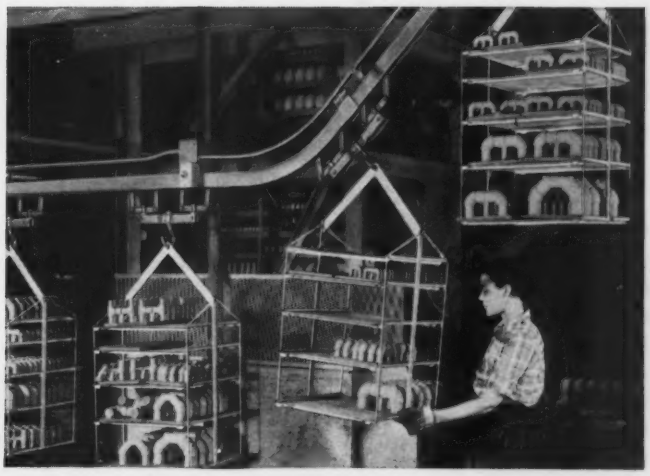
Circle 598 on Page 53



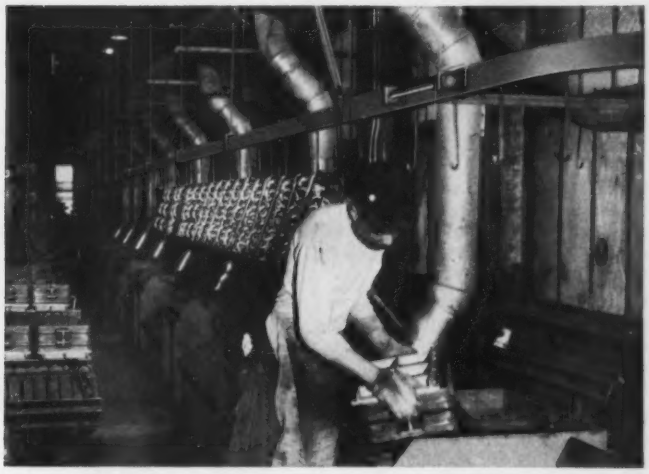
Circle 599 on Page 53

CONVEY CORES & CASTINGS OVERHEAD ...SWIFTLY SAFELY & ECONOMICALLY WITH R-W "Zig-Zag"®

CONTINUOUS POWER CONVEYORS



Cores may be efficiently moved to and from the baking ovens and then on to checking benches via an R-W "ZIG-ZAG" Conveyor. Eliminates hazardous lifting and danger of costly breakage.



R-W "ZIG-ZAG" Conveyors provide a cost, space time saving way to move die castings from the casting operation through cleaning, grinding and checking stations and on to shipping. Smooth continuous product flow speeds-up production; eliminates costly bottle-necks.

Speed-up production, cut handling costs, eliminate breakage and increase profits with an R-W "ZIG-ZAG" Conveyor. Unit loads of up to 125 lbs. are carried up, down, in, out and around at a speed to meet your particular requirement. They are strong, flexible, efficient and safe... all moving parts of the chain are fully enclosed and protected from dirt and dust. "ZIG-ZAG" conveyors are economical to purchase... economical to operate and maintain... economical to install. May be installed and later expanded or altered by plant personnel. Write today... request Catalog A-93R.

FOR FAST, SAFE LADLE HANDLING

Reduce handling costs safely and speed-up production with R-W Crane and Monorail Conveyor Systems. Whether you need a single unit for a specific job or a complete system, R-W cranes and Monorail Conveyors provide smooth, safe ladle handling plus 100% utilization of the pouring area. Transfer cranes with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. Let an R-W Sales-Engineer show you how R-W equipment can save you time, money and maintenance costs. Write today for complete information.

Richards-Wilcox
MANUFACTURING COMPANY
"MATERIAL HANDLING DIVISION"

466 W. THIRD STREET, AURORA, ILL. Branches in Principal Cities

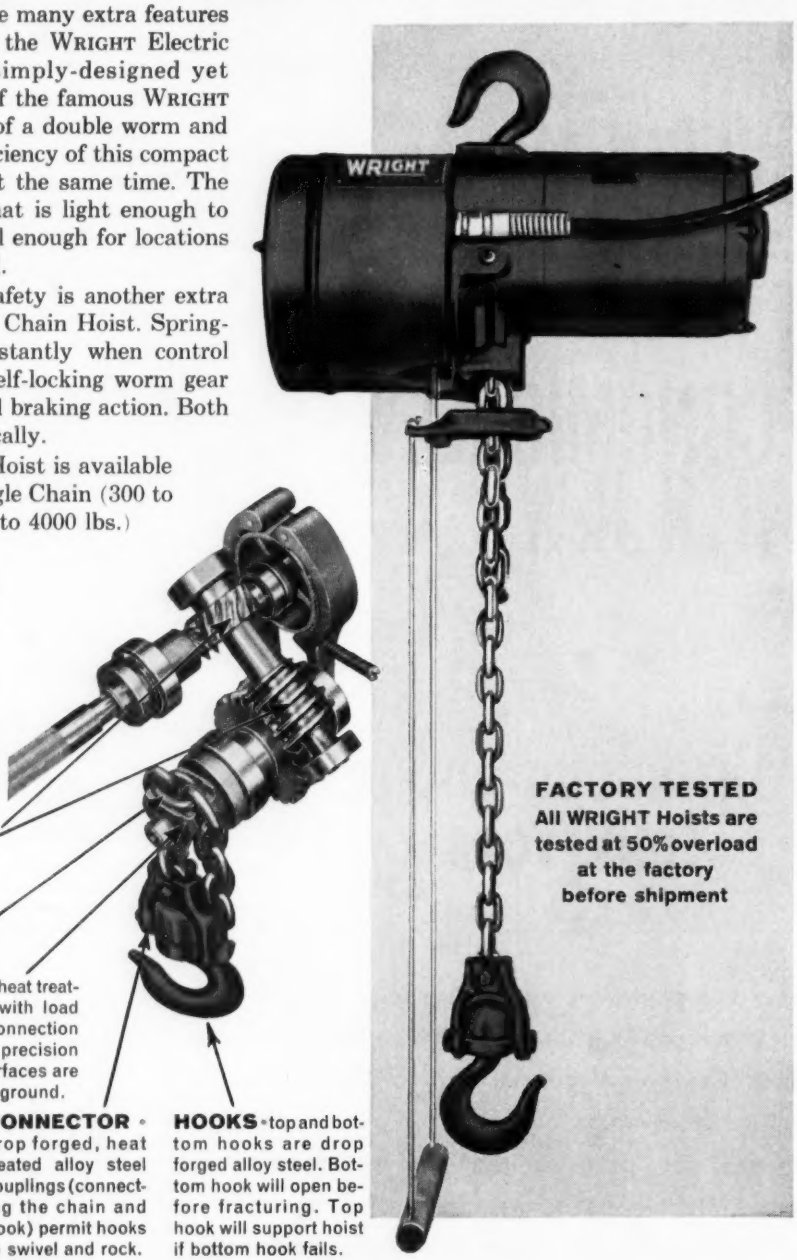
Circle 600 on Page 53

Light, Rugged Wright Electric Chain Hoist with Extra Features at No Extra Cost!

• Here's an inside picture of the many extra features you get at no extra cost with the WRIGHT Electric Chain Hoist. Shown is the simply-designed yet ruggedly-constructed "heart" of the famous WRIGHT Electric Chain Hoist. The use of a double worm and gear reduction increases the efficiency of this compact unit, and reduces the weight at the same time. The result is a trouble-free hoist that is light enough to move from job to job and small enough for locations where overhead space is limited.

• Double braking for double safety is another extra feature of the WRIGHT Electric Chain Hoist. Spring-operated motor brake locks instantly when control cord is released. In addition, self-locking worm gear drive also provides positive load braking action. Both brakes work together automatically.

• The WRIGHT Electric Chain Hoist is available with two types of reeving—Single Chain (300 to 2000 lbs.), Double Chain (3000 to 4000 lbs.)



HOIST MOTOR • specially wound to give extra torque for intermittent hoist duty. 15 feet of three wire rubber covered conductor cable with strain reliever attachment.

CONTROLLER • manually operated heavy duty drum type with large contact points and full-arc shields. Fast response enables spotting a load within fractional inch limitations.

HOISTING GEARS • made of high grade phosphor bronze, worms of heat treated steel. Gears are fully enclosed in a continual oil bath.

CHAIN • heat treated alloy steel with zinc coating. Accurately blocked to fit load sheave. Ductile, yet hard enough to resist wear and abrasion.

LOAD WHEEL • drop forged, heat treated alloy steel. Forged integral with load shaft to eliminate the need for connection keys or spline. Chain pockets are precision machined to fit links. Wearing surfaces are hardened, bearing surfaces are ground.

CONNECTOR • drop forged, heat treated alloy steel couplings (connecting the chain and hook) permit hooks to swivel and rock.

HOOKS • top and bottom hooks are drop forged alloy steel. Bottom hook will open before fracturing. Top hook will support hoist if bottom hook fails.

FACTORY TESTED
All WRIGHT Hoists are tested at 50% overload at the factory before shipment

WRITE FOR FULL INFORMATION

Detailed information about the five WRIGHT products shown is available by writing our York, Pa., office. Please specify literature by number

Electric Chain Hoist DH-73
Type "C" Pull-A-Ways DH-56
Safeway Hand Hoists DH-164
Roller-Bearing Trolley DH-242
Jib Cranes • DH-300

WRIGHT HOISTS

ACCO

Wright Hoist Division • American Chain & Cable Company, Inc.
York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Circle 601 on Page 53

Howard Heath's broad experience is welcomed by Alcoa's customers at all levels of production. In this picture, Elmer Sachse, Alcoa salesman, on the left, and Mr. Heath, on the right, are examining a boat davit produced by the Linmold Company of Compton, Calif. Mr. Lester Marcuse, general sales manager of Linmold, is in the center.

Howard Heath speaks "Foundry"

Foundrymen have a language all their own. Even some engineers and metallurgists never master it. But Alcoa's Howard Heath speaks it fluently, and this makes Howard unusually valuable to Alcoa's customers. When foundrymen tell him about a problem, he can get to the core of it quickly because there's no language barrier; then he can put his answers in suggestions that foundrymen understand.

That's why Alcoa uses Howard Heath as a field service metallurgist. West Coast foundrymen will tell you that in his case that title stands for unique service and a remarkable amount of savvy.

During the hectic years of World War II, Howard was superintendent of all the foundries—sand, permanent mold and magnesium—in Alcoa's booming Vernon Works. But, in spite of the magnitude of that job, we were always calling him out to solve problems in the foundries of Alcoa's pig and ingot customers who were also engaged in essential work. No one else, it seemed, could analyze the trouble and come up with the answer as quickly as Howard.

After the war, when the pace slackened a bit, we found we had other men who could run the foundries, but no one who could quite fill Howard's shoes with our customers. So we put him to work full time helping them.

Help like this is unique in the aluminum industry, and it's why you get more than 16 ounces of metal in every pound of Alcoa® Aluminum you buy. Nine thousand times a year, calls for help get prompt attention from Howard and 36 other Alcoa service representatives with various titles and specialties. In Howard's case, the solution may be as simple as relocating a riser in a sand casting pattern. Or as complex as checking 700 critical points on the mid-frame casting for a jet fighter. But no problem stumps a man with a background of experience like Howard Heath's.

Over the years, Alcoa has pioneered many of the major advances in light-metal foundry practice. It's because Alcoa is willing to share this experience with its customers that you get more than 16 ounces of aluminum when you buy a pound of pig or ingot from Alcoa.

Send for Alcoa's New Pig and Ingot Brochure

This new 12-page booklet lists all grades and alloys available in pig, ingot and billet form, together with their composition and properties. It also describes the services and technical assistance available from Alcoa's metallurgical staff, the most experienced and unbiased in the industry. Write today: Aluminum Company of America, 2115-F Alcoa Building, Pittsburgh 19, Pa.

World-wide sales through Alcoa International, Inc., 230 Park Avenue, New York 17, N.Y.

ALCOA ALUMINUM

FOR EVERY PIG AND INGOT REQUIREMENT

Circle 602 on Page 53

INTERNATIONAL Molding Machine Co. Marks 50th Year

4th Generation of Pridmore Clan Serves Foundry Industry

Back in 1884 when Henry E. Pridmore started his little foundry molding machine business at the suggestion of Cyrus McCormick, President of the famous McCormick Works—now International Harvester Company, he probably never visualized the long history that would result from this modest beginning.

It was at the time of the Haymarket Riots and labor unrest in Chicago, that Mr. McCormick advised young Pridmore to go into business for himself. Pridmore had, for some time, been designing and building the early molding machines for the McCormick Company's foundry.

As the 20th Century got under way, Henry's son, Edward A. Pridmore, came into the business. In 1910 Edward left the company to form his own firm which was to soon bear the name International Molding Machine Company. Through the past 50 years, International Molding Machine Company and their products have come to be known as the standard of the industry.

Now, in 1960, the third generation headed by son Lawrence D. Pridmore, President, and son-in-law, Tyrrell B. Eichler, Secretary and Treasurer, are operating the company. In recent years, Lawrence D. Pridmore, Jr. and Tyrrell Eichler, Jr., members of the fourth generation of the family, have joined the company and are actively engaged in the business of building molding machines for the foundry industry.

The families of Larry Pridmore, Jr. and Terry Eichler, comprising the fifth generation, are well under way and will, no doubt, carry on the traditions combining the Pridmore name with International Molding Machine Co.

Henry E. Pridmore
1849-1908

Edward A. Pridmore
1882-1943

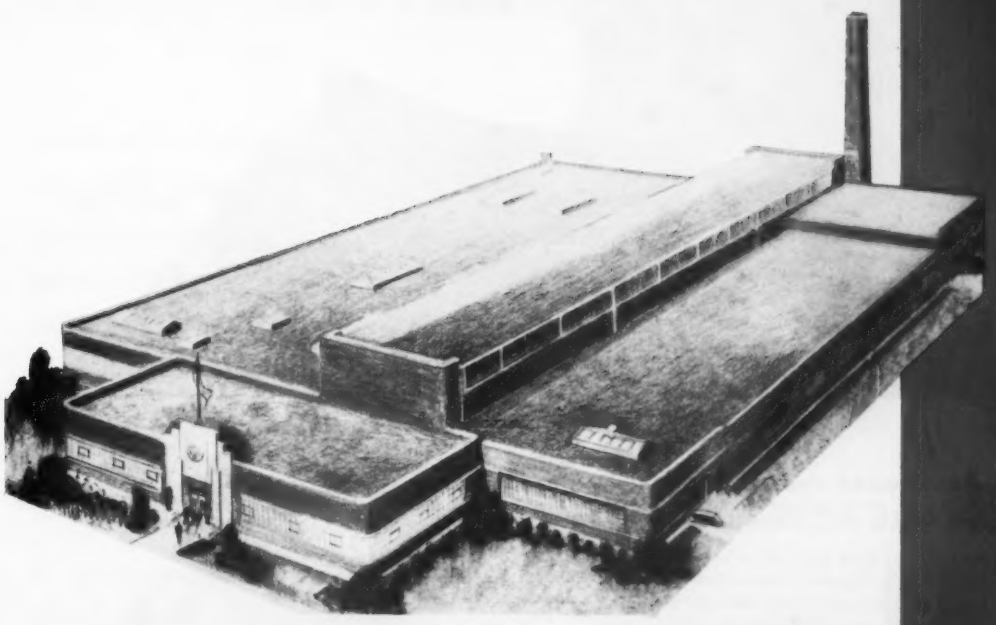
Lawrence D. Pridmore
President

Tyrrell B. Eichler
Secretary

Lawrence D. Pridmore, Jr.
Asst. to President

Tyrrell B. Eichler, Jr.
Asst. to President

50
YEARS of SERVICE
to the
FOUNDRY



INTERNATIONAL

MOLDING MACHINE COMPANY

LA GRANGE PARK, ILLINOIS

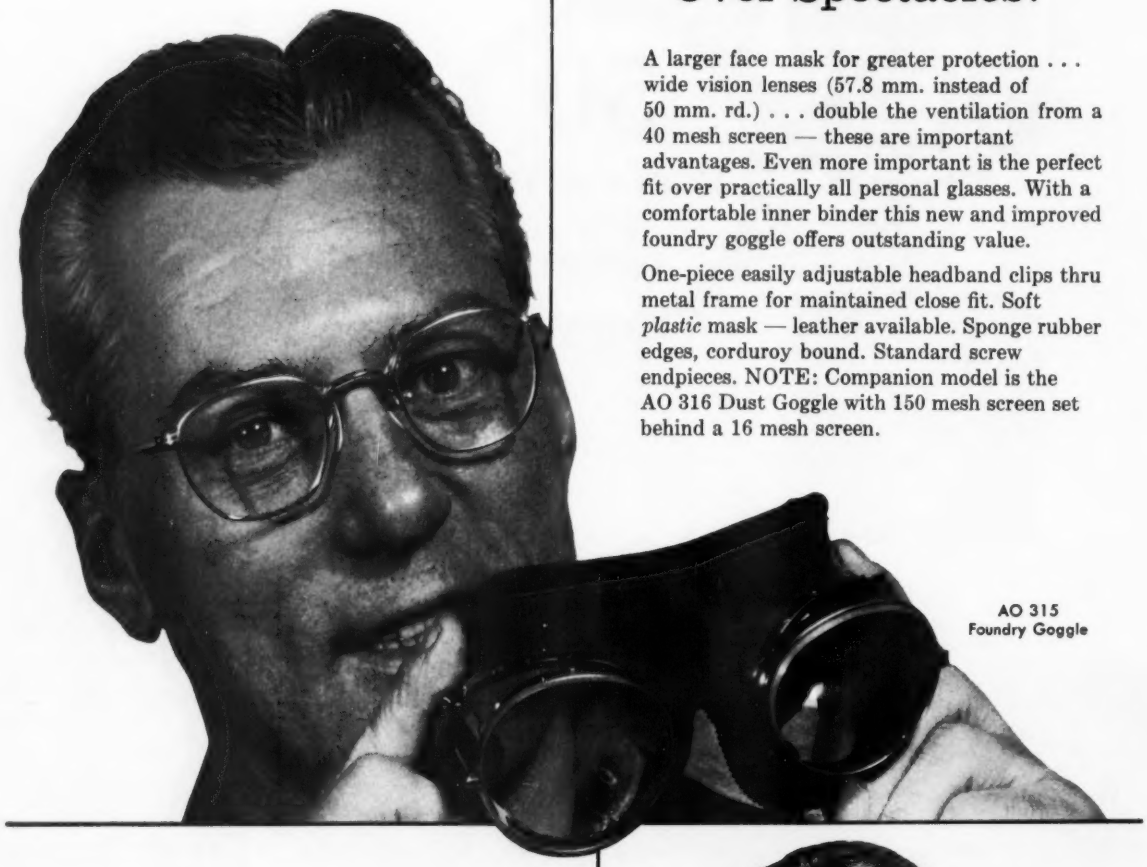
Circle 603 on Page 53

- GREATER PROTECTED AREA
- BETTER VISION (57.8 mm. Lenses)
- INCREASED VENTILATION
- MORE COMFORTABLE BINDER

Here's the ONLY Foundry Goggle that Fits Over Spectacles!

A larger face mask for greater protection . . . wide vision lenses (57.8 mm. instead of 50 mm. rd.) . . . double the ventilation from a 40 mesh screen — these are important advantages. Even more important is the perfect fit over practically all personal glasses. With a comfortable inner binder this new and improved foundry goggle offers outstanding value.

One-piece easily adjustable headband clips thru metal frame for maintained close fit. Soft *plastic* mask — leather available. Sponge rubber edges, corduroy bound. Standard screw endpieces. NOTE: Companion model is the AO 316 Dust Goggle with 150 mesh screen set behind a 16 mesh screen.



AO 315
Foundry Goggle

Prevent Accidents — Maintain Production with AO Sweatbands

They keep sweat out of eyes and off safety lenses. Prevent accidents due to blurred vision and foreign matter from being carried into eyes, thereby reducing eye dispensary cases. Model 109B weighs only ½ oz. — absorbs many times its weight. 1¾" wide. Adjustable head strap.

Your nearest AO Safety Products Representative can supply you. Always insist on AO Trademarked Safety Products.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS
Safety Service Centers in Principal Cities

Be Safe for Sure . . . with AO SURE-GUARD Equipment

Circle 604 on Page 53

Circle 605 on Page 53→

To meet the need for

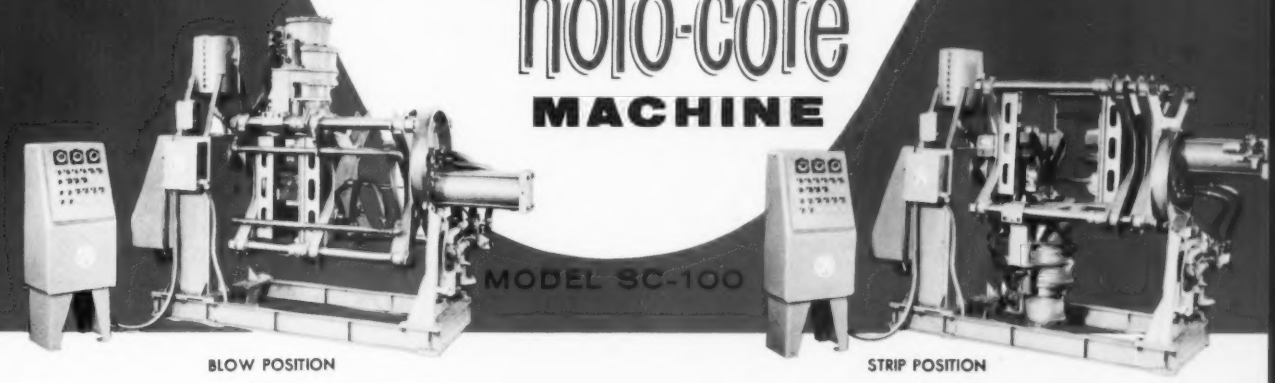
LARGE PRECISION CORES . . .

at lower cost

BULLETIN SC-100

THE NEW AUTOMATIC VERSATILE SPO TOP-BLO

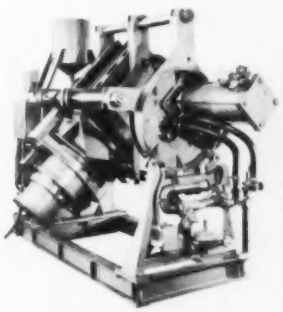
holo-core MACHINE



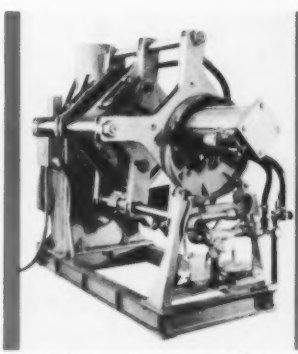
BLOW POSITION

STRIP POSITION

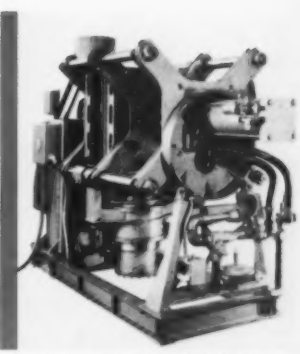
Designed for faster automatic production of uniform standard cores, this machine features one-man operation, precision controls, 100 lb. blow capacity



1. After blow and dwell, machine indexes 225° to first drain-out position.



2. Machine then returns 90° to finish drain-out. Sand drains into blow head.



3. Machine indexes to strip position to complete curing cycle.

The outstanding accuracies and savings being achieved with precision hollow cores in all types of molding operations have created a demand for larger capacity equipment. To meet this requirement, SPO . . . the leading producer of shell core machines . . . has developed the MODEL SC-100. With a blow capacity of 100 lbs. of sand, this versatile new unit will mass produce large single-cavity hollow cores as well as a wide range of small cores in multi-cavity boxes.

Holo-Core MODEL SC-100 is designed to produce ***ready-to-use cores in 90 seconds or less***, depending upon individual size, complexity and wall thickness required. All operations are fully automatic except actual removal of finished cores from boxes. And typical of SPO's advanced foundry-oriented design and engineering, MODEL SC-100 assures outstanding speed, simplicity, safety and savings.

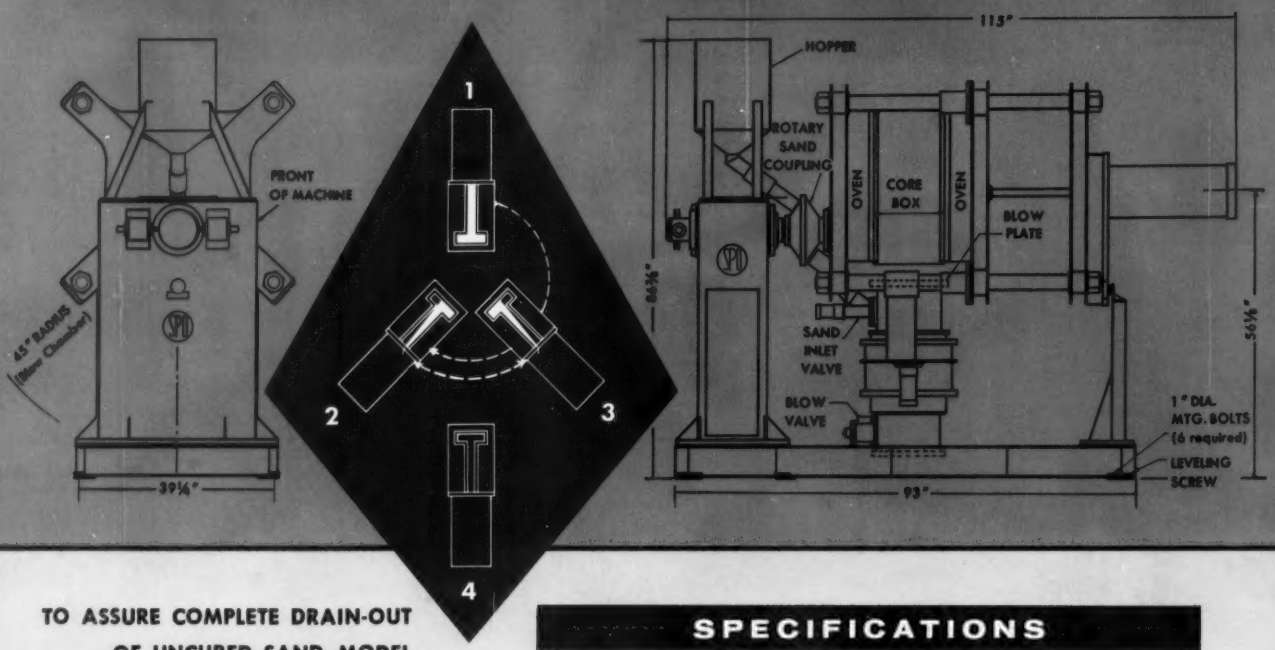
Operating and design features of MODEL SC-100 include automatic gravity sand feed . . . integral direct-acting springless stripping mechanism . . . automatic, timer controlled, independently adjustable blow, dwell, drain-out and cure cycles . . . gas-fired thermostatically-controlled ovens to assure accurate temperatures for contour or solid-back core boxes . . . simplified core box mounting to permit fast, easy change in size or type . . . shock-resistant heavy-duty construction in all components as well as basic machine structure.

As the world's largest supplier of foundry molding machines, SPO is fully qualified to help you evaluate and solve your specific hollow core problems. Both production and jobbing foundries are enjoying new concepts of speed, precision and economy by utilizing SPO Holo-Core designs in conjunction with SPO molding machines and SPOMATIC integrated molding systems. Our engineers will be glad to discuss your requirements.

4. Large platens take core boxes up to 24" x 30" x 14". With largest size box, max. opening is 15".

MODEL SC-100

TOP-BLO holo-core MACHINE



TO ASSURE COMPLETE DRAIN-OUT OF UNCURED SAND, MODEL SC-100 UTILIZES A VARIABLE 3-POSITION DRAIN CYCLE. SURPLUS SAND RETURNS TO BLOW HEAD FOR RE-USE.

SPECIFICATIONS

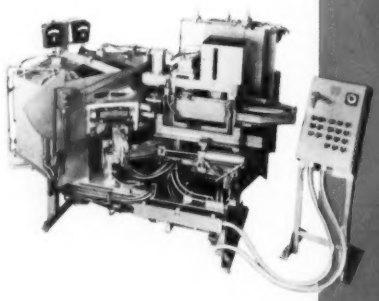
CORE BOX DIMENSIONS: Size range of vertically parted boxes

DEPTH	HEIGHT	THICKNESS
Min. 10 in.	Min. 15 in.	Min. 6 in.
Max. 24 in.	Max. 30 in.	Max. 14 in.

OPERATING AIR LINE PRESSURE: 80 psi ELECTRICAL CONTROLS: 110 Volt, 60 Cycle
GAS PRESSURE: 4 ozs. OVER-ALL HEIGHT: 86⅜ in. SHIPPING WEIGHT: 6,000 lbs. (domestic)

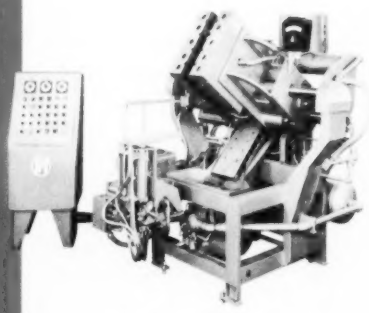
specify SPO . . . the complete line of precision shell core machines

SPO Holo-Core machines facilitate new molding techniques that assure greater economy, efficiency and production capacity. Because they produce ready-to-use precision cores in seconds, they can be integrated into molding machine lines to reduce handling or transfer time and costs.



Holo-Core MODEL SC-10-R

A fully automatic 6-station design for mass production operations, this machine handles core boxes up to 10" x 12" x 6" in a 2-stage thermostatically controlled oven. *Its complete cycle is 15 seconds or less.*



Holo-Core MODEL SC-30

Designed for complete drainage of uncured sand from horizontal arms, this Angle-Blo machine has 30 lb. blow capacity . . . takes boxes up to 16" x 21" x 9". Can be fully automatic, including stripping of finished cores.

SPO INCORPORATED

Department HC
7500 GRAND DIVISION AVENUE
CLEVELAND 25, OHIO
Telephone: Diamond 1-3666

8984-SI

Litho in U. S.

HERE'S PRICE *plus* PERFORMANCE!

STEEL SHOT AND GRIT

$165.00 *per ton* *in truck loads*

Don't let anyone tell you that good steel abrasives can't be made at lower cost. METAL BLAST is doing it — and passing the savings along to YOU! An entirely new manufacturing method does away with costly equipment and processing used by others — turns out a product meeting rigid steel tests and guaranteed to equal the performance of any steel abrasive on the market. So, don't let the price suggest otherwise! "SUPER-STEEL" is top quality steel shot and grit and cleans as top quality abrasives should. At $165 per ton, you can save many important dollars. A trial will prove it! Write, wire or phone (collect) for further information, trial order or free testing sample.

METAL BLAST, INC.

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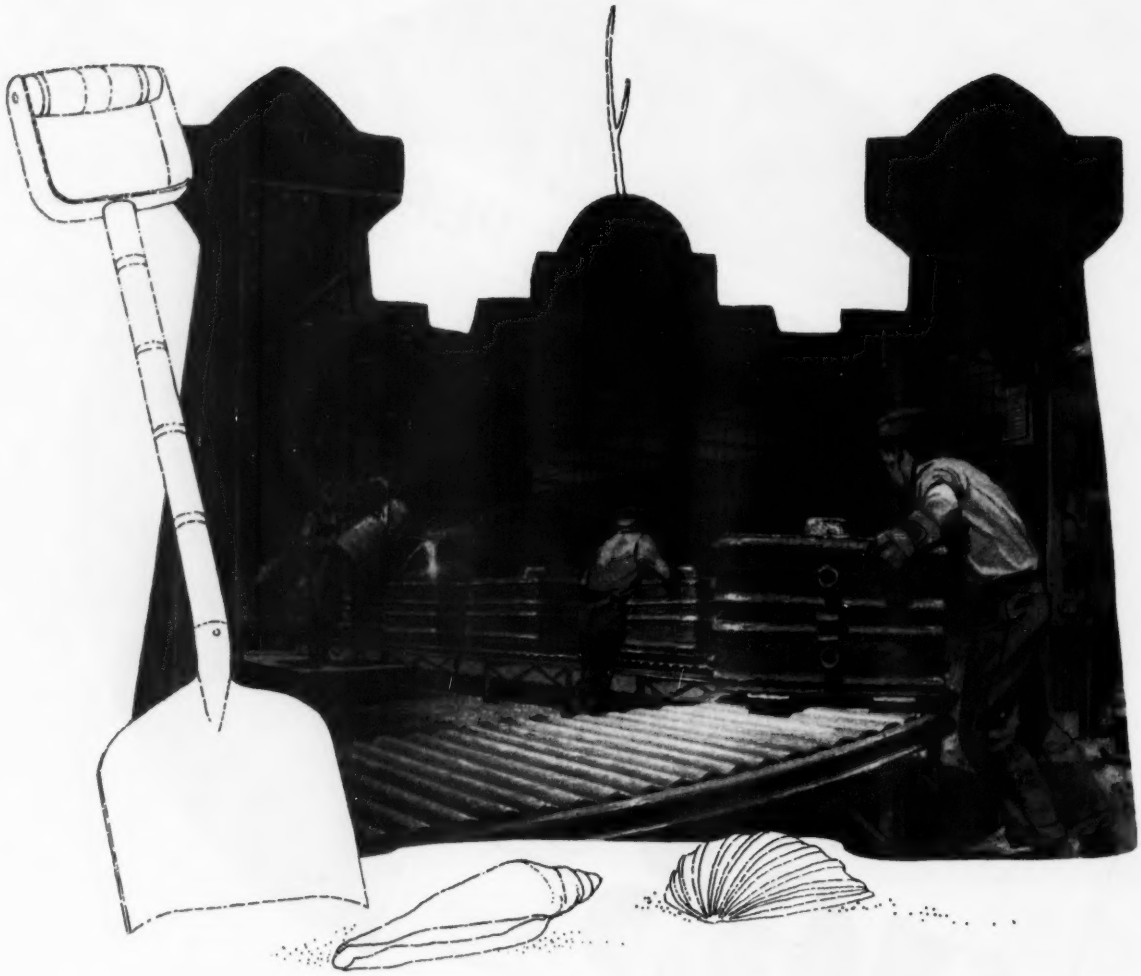
ALSO IN: Chattanooga • Chicago • Cincinnati • Dayton • Detroit • Elberton, Ga. • Grand Rapids • Greensboro, N. C. Houston • Los Angeles • Louisville • Milwaukee • Minneapolis • New York • Philadelphia • Pittsburgh and St. Louis.

Circle 606 on Page 53



Sand Castles in motion . . . intact

Cores and molds—the work-a-day sand castles of the foundry—require the smoothest conveyor ride you can give them. Anything less can result in costly breakage or even in undetected sand shifting—*undetected until the faulty casting appears.* One important protection against losses is a precision-engineered Logan Conveyor line.

From core room to shipping, each line of a Logan Foundry Conveyor System is perfectly fitted to its job and built to give long dependable service under the loads it must handle. That means the utmost precision where it is needed, and it also means the lowest feasible over-all cost.

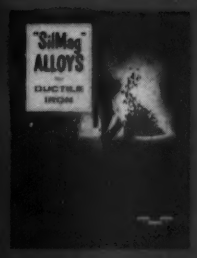
"The Man from Logan"—a highly trained field engineer in your area—is your source for a custom Logan Conveyor installation. He is prepared to focus two generations of Logan experience directly on your job. "The Man from Logan" is fully qualified to take over on design and specification and see your job through to smooth operation. Call or write us today for a visit from this specialist.

"The Man from Logan"

Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

1

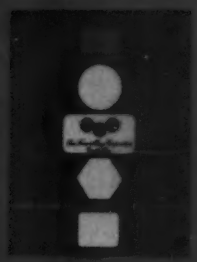


A comprehensive brochure on ductile iron, its properties and applications. Includes data on melting, desulfurizing, alloying, heat treating, and foundry practice. 23 pages including many illustrations and charts.

2

A study of the plunging technique for introducing magnesium alloys in ductile iron. Discusses cost and process advantages, and special packaged alloy for this application. Illustrated, with charts on ladle dimensions and alloy additions.

3



Newly revised, details use of ferro-alloy briquets for economic convenient additions to cast iron. Unique identification system ends all confusion in charging alloys.

HERE'S HELP!

There's help for you in each of the Ohio Ferro-Alloys publications shown here and you are welcome to all or any one of them without obligation. To receive your copies promptly, simply use coupon below or call the Ohio Ferro-Alloys office nearest you.

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5

6

A comprehensive series on the function of these important alloying elements in cast iron, detailing various alloys available and a guide to their proper selection and use.

Ohio Ferro-Alloys Corporation

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Without obligation send me the literature checked.

- ☐ 1 Sil Mag Alloys for Ductile Iron brochure
- ☐ 2 Ductile Iron brochure
- ☐ 3 New Briquet brochure
- ☐ 4 Chromium brochure
- ☐ 5 Silicon brochure
- ☐ 6 Manganese brochure

NAME
COMPANY
ADDRESS
CITY ZONE STATE

Circle 608 on Page 53

Stub at left shows average waste with conventional cutting carbons; piece at right shows small amount of waste with Kostkutter Rods.

"We save 20 to 25% over conventional cutting carbons with Speer's new KOSTKUTTER RODS*"

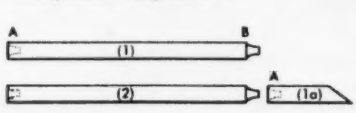
says Benjamin Desper, Cleaning Room Foreman, Atlantic Steel Castings Co., Chester, Pa.

You can save money too! The revolutionary design of Kostkutter Rods, a Speer development, allows the joining of the normally discarded 2½ to 3 inches "waste" to the front of the next rod for further use. Additional savings are realized due to reduced torch damage. It is no longer necessary to economize by burning carbons close to the clamp, bringing the torch too near the hot spot. Additional "left over" carbon is used up with the next rod. This virtually eliminates stub loss. It is important to note that Kostkutter Rods are copper plated (except for the tapered sections) after shaping the rod ends, thereby insuring perfect contact between rods.

Kostkutter Rods are available only from Speer. Buy them in diameters of ½", ⅝", ¾" and 1". Standard cutting carbons are also available at slightly lower prices.

How Kostkutter Rods Save You Money

Each Kostkutter Rod has a tapered hole in one end (A) and a tapered projection at the other end (B) as shown in Diagram 1. The rod is clamped into the torch and used in the normal way. The stub end (Diagram 1a) which, with conventional cutting carbons would be wasted, is removed from the torch and attached to the end of a new Kostkutter Rod (Diagram 2). The tapered end of the new rod slips easily into the tapered hole at the end of the stub and is held firmly by friction. The new rod, with the stub attached, is then clamped into the torch and practically the entire stub is used up instead of being discarded.



SPEER Carbon Co.
Carbon Products Division • St. Marys, Pa.

*Patent applied for

Circle 609 on Page 53

Newaygo Engineering Company — Leaders in

PALLET LINE SYSTEMS OF MOLD HANDLING

for Higher Mold Production at Lower Molding Costs!

As of October, 1959, heavy duty foundry installations in operation total close to TEN THOUSAND LINEAL FEET of Newaygo Pallet Line Systems, consisting of top set out track, automatic mold discharge, and underneath car return, — operating approximately 5,600 Pallet Cars; — which, using average rates of production for molders using these lines and cars, means that these Pallet Line Systems are producing an average of 42,500 molds per working day, for approximately 10,200,000 molds per year!

Projecting the average amount of metal poured in molds by these systems, around 1,200,000 pounds of castings are produced per day, or approximately 300,000,000 pounds or 150,000 net tons of castings per year.

One foundry reports the outstanding performance of Newaygo's Pallet Line System by averaging 450 molds per 7½-hour day per man, using a 14" x 16" x 12" deep mold. This yields a mold per minute per man, and each man is making the complete mold in snap flasks and setting his own cores.

FOUNDRY Magazine's October, 1959 issue established a base of 100% for purchases of foundry equipment during the 1947-49 period, and reported the growth index of 154% for the first seven months of 1959 for all producers of Foundry equipment. *Newaygo's per cent increase for the same period is 224%,* — another evidence of leadership as designers, manufacturers and installers of complete sand handling systems and foundry automation equipment.

Shown above is a view from the pouring floor of a 19-station midwest steel foundry, showing specially designed molding hoppers of Stainclad Steel with air-operated gates. Also shown is the mold storage end of the Pallet Car set-out track system. Molds are handled on pallet cars and are automatically dumped at end of lines into a vibrating pan conveyor. Pallet Cars and boards are automatically returned on an underneath track system.

The presentation of "NEWAYGO PALLET LINE SYSTEMS FOR MOLD HANDLING" is yours for the asking, in a 16mm, 25-minute MOVIE, which shows many types of Pallet Line installations in foundries.

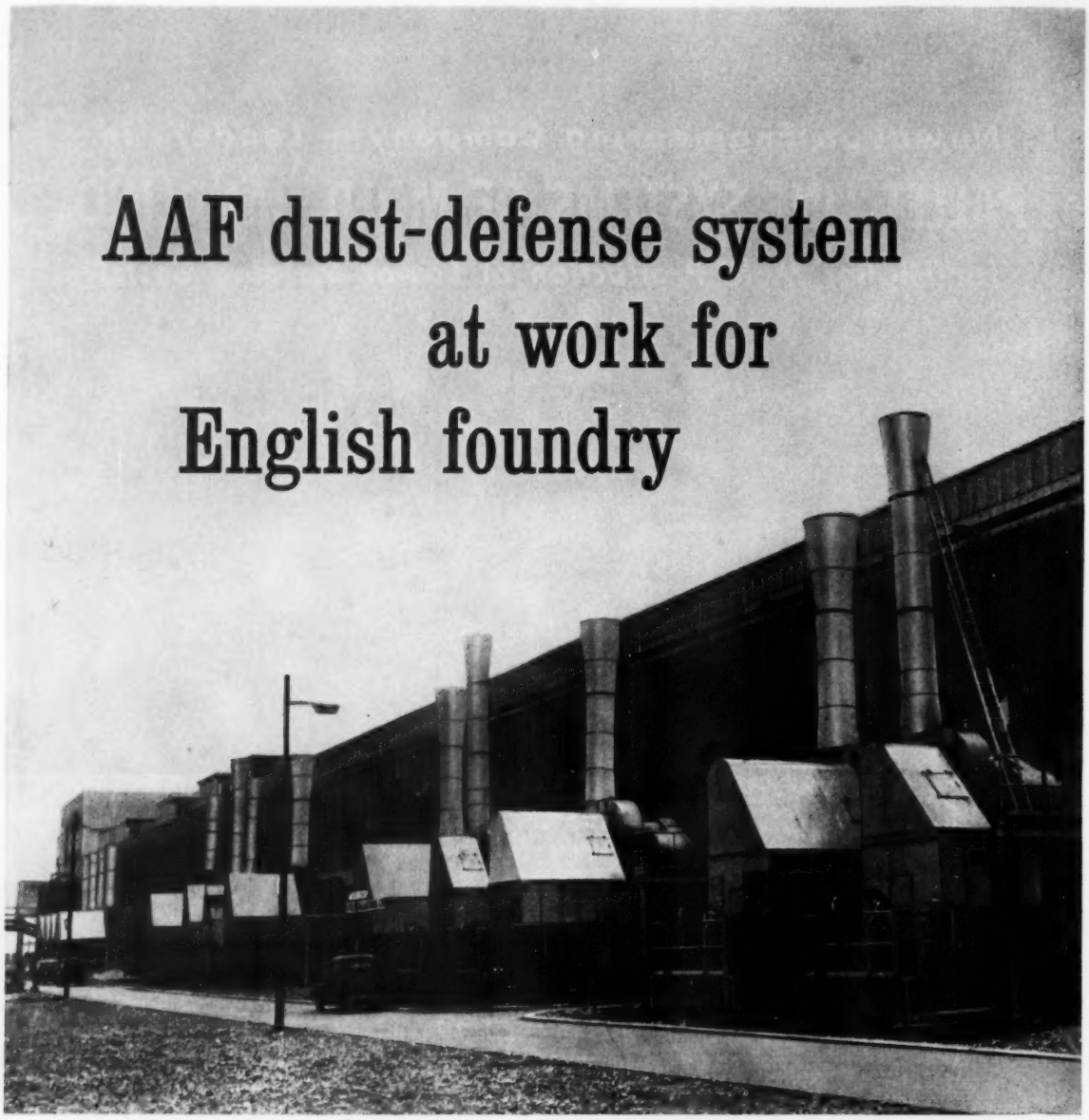
NEWAYGO engineering company
NEWAYGO, MICHIGAN

. . . and profitable, too, with **NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT**

Also Manufacturers and Installers of MULTI-LEVEL HOPPER CONTROL SYSTEMS, CAR CONVEYORS, APRON CONVEYORS, ROTARY FEEDERS, and FOUNDRY AUTOMATION.

Circle 610 on Page 53

AAF dust-defense system at work for English foundry



Dust is the universal foundry problem, the inevitable by-product wherever castings are made. Fortunately, the *solution* is universal, too: AAF dust control.

A case in point is the new Thames foundry of Ford Motor Company, Ltd., at Dagenham, England. AAF collectors here are exhausting 700,000 cfm of dust-filled air from core sand mixing plants, core grinding lines, moulding lines, primary and vibratory knockouts, backscrap and sand preparation plant, chipping and grinding lines and abrasive cleaning plants.

AAF's complete line of dust control equipment was application-developed, now challenges *any* foundry dust control problem—*anywhere.*

For more information, call your local American Air Filter representative or write us direct. Address: Mr. Robert Moore, American Air Filter Company, Inc., 266 Central Avenue, Louisville, Kentucky.

AAF American Air Filter

BETTER AIR IS OUR BUSINESS

Circle 611 on Page 53

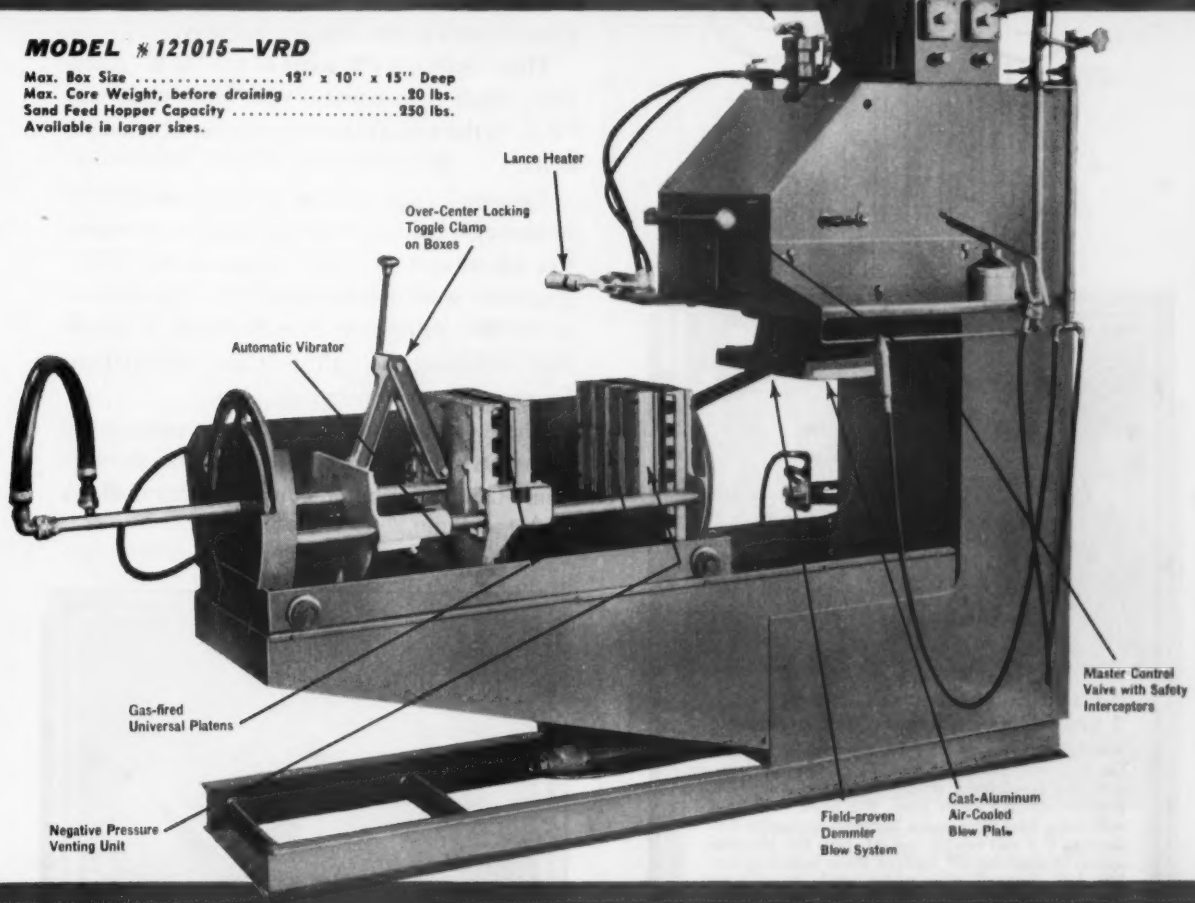
a low-cost, true shell core blower of rugged Demmler quality

DEMMLER

"Utility" Semi-Automatic SHELL CORE BLOWERS

MODEL # 121015—VRD

Max. Box Size .....12" x 10" x 15" Deep
Max. Core Weight, before draining .....20 lbs.
Sand Feed Hopper Capacity .....250 lbs.
Available in larger sizes.



MORE FOR YOUR FOUNDRY DOLLAR

TYPICAL CORES SUITABLE FOR PRODUCTION ON THE "UTILITY" SHELL CORE BLOWER.

Circle 735 on Page 53

OPERATING FEATURES:

1. Sand fed automatically from feed hopper into blow magazine. Hopper can be replenished without stopping production.
2. Over-center toggle lock for positive box closing and opening.
3. Master control lever shuttles box under blow head, clamps it, blows, unclamps and shuttles box to rollover drain position.
4. Rollover designed so that weight of boxes remain within the radius of rotation . . . no out of balance weight to struggle with.
5. Vibration applied to boxes automatically in rolledover drain position for consistency of core wall thickness.

DEMMLER MANUFACTURING COMPANY • KEWANEE, ILLINOIS

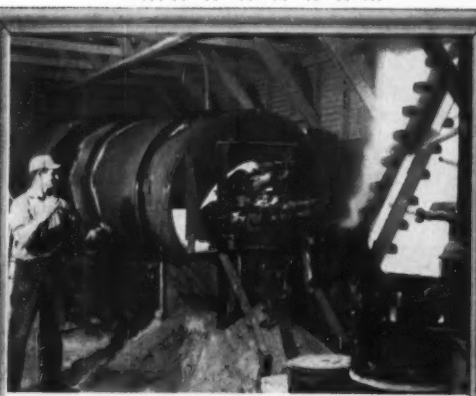
HAULS OF

HERE are three examples of United States Rubber Conveyor Belt performance, taken from records in the foundry industry.

These belts are just some of the "U.S." stand-outs which demonstrate, year after year, why "U.S." is the world's largest producer of conveyor belts.

For steady, day-in-and-day-out dependability in conveyor belting, it always pays you to secure the advantages of "U.S." Engineering. "U.S." Engineers work directly with "U.S." Distributors or original equipment manufacturers to assure their obtaining the right belt recommendations for each type of conveying.

The most comprehensive belting engineering information in the industry is available through your "U.S." Distributor. It will pay you to check with him.



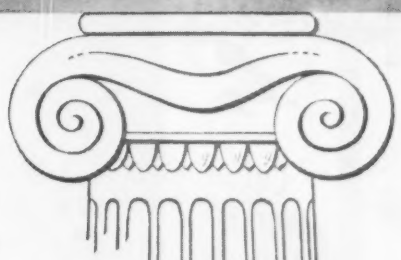
"This U.S. Rubber Belt has been on the job 3 times longer than any belt previously used," says co-owner J. C. Barry of Barry Sand Co. (Silsbee, Texas), producers of foundry, chemical and specialized sands. "We have two U.S. Rubber elevator belts here. We need belts that will last a long time under terrific heat (up to 450 degrees F.) and terrific weight, plus the abrasive action of sand. So far, each of these belts has outlasted the belts of other makes while showing no signs of wear. *These belts never fail us... no lost production, no downtime.* We are very satisfied. They do our job best."

Turn on the Heat
— this Belt can take it!

Until now, hot materials belts suffered from many different shortcomings. Splices would fail prematurely; abrasion resistance and heat aging would be greatly accelerated as temperatures rose; the carcass of glass fabric belts required special treatments to improve adhesion (and these special treatments themselves would break down).

But now, all these unsatisfactory qualities have been eliminated by U.S. Rubber's premium belt for hot service, Type HTB Glass Fabric Belt. Thoroughly tested on the toughest kinds of hot materials jobs, U.S. Type HTB has given maximum performance under maximum operating temperatures.

FAME



COMPARE THESE ADVANTAGES

- Heat-resistant cover of specially compounded high-temperature Butyl rubber to withstand excessive heat.
- *Exclusive* all-glass carcass, woven to be self-cushioning and to prevent internal abrasion . . . eliminates premature char-out . . . maintains full strength throughout the longer life of the belt . . . gives life-of-the-belt adhesion without special treatment . . . provides superior flex life, fastener-holding strength and heat aging.
- Thinner belt for better heat dissipation, because bulky asbestos and duck plies have been eliminated.
- New high-temperature Butyl cover and all-glass fabric carcass combine to provide perfectly balanced belt of unexcelled heat resistance.
- Belt can be engineered to specific conditions of heat, abrasion and operating tensions.
- Lower cost-per-ton because of competitive price and longer belt life.

Tramp Iron can't go on a TEAR on this belt!

Hot foundry sand loaded with jagged pieces of tramp iron is a murderous combination for a conveyor belt.

That's why foundries use U.S. FoundryGiant *RipStop* Conveyor Belts. These special heat-resistant belts have rip-stopping wire ribs imbedded in the carcass across the belt at 3' intervals to prevent the jagged pieces of metal flash, sprues, gates, geigers, etc., from going on a tear and wrecking the belt. "U.S." belts are lasting 8 times longer than other belts in many foundries. Photo shows belt in a leading Southern foundry.

Mechanical Goods Division

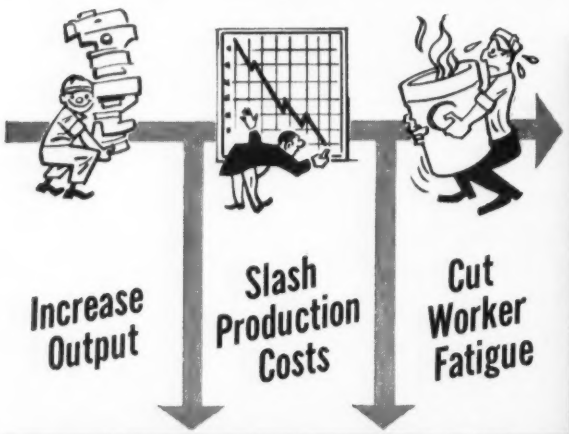
United States Rubber

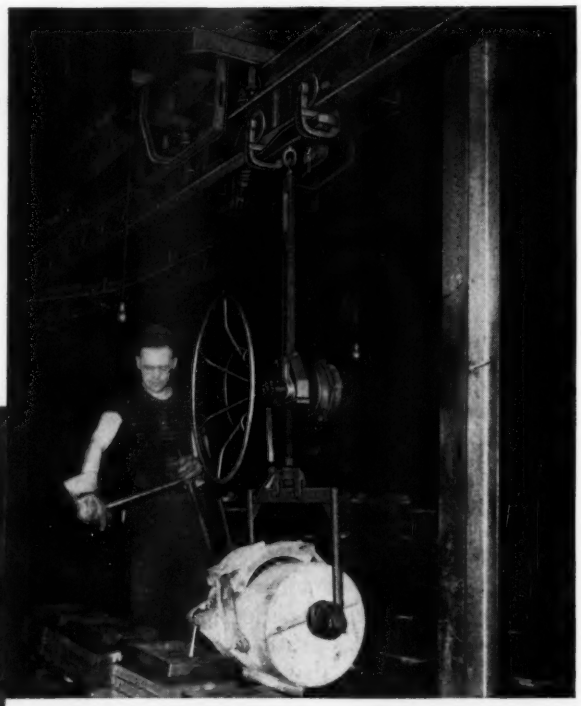
WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Circle 612 on Page 53

Convey Hot Metal *the Efficient* Tramrail Way





THE advantages that a Cleveland Tramrail System bring to a foundry are so outstanding that the results are often little less than phenomenal. Wherever the equipment is installed, efficiency usually spurts upward an exciting amount.

This is very evident in the handling of hot metal. Large ladle-fulls can be taken directly from cupola to molds without in-between transferring. This means fewer trips and faster pouring. Heat loss is greatly reduced. The work is safer and easier because it is simply a matter of guiding the smooth-rolling overhead carriers.

The same overhead trackage can be used for most other handling: Patterns, cores, sand, flasks, castings, etc. and save time and worker fatigue on every lift and move.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3833 East 286th Street Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

they turn in top performance to turn out top results

approved for better grinding

SIMONDS SNAGGING WHEELS

Better grinding evident in fast stock removal with less wheel wear! That's why Simonds Snagging Wheels get the nod of approval in leading foundries, steel mills and metal-working plants. Resinoid bonded wheels contain a special additive that provides an internal lubricant for better grinding action . . . and are identified by new short markings, A166-R, C16-S, etc. Vitrified bonded wheels for gray iron contain V9 Bond, a chemically designed glass bond for greater uniformity and consistently superior performance.

Write for Bulletin ESA-305

SIMONDS
ABRASIVE CO.

Tacony & Fraley Sts.
PHILADELPHIA 37, PENNA.
Division of Simonds Saw and Steel Co.

COUNT ON / YOUR SIMONDS DISTRIBUTOR
FAST SERVICE • LOCAL STOCKS

WEST COAST PLANT: EL MONTE, CALIF.—BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO
SHREVEPORT—IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC

Circle 614 on Page 53

For every foundry—best news in years!

Norton Resinoid Wheels Now Better Than Ever

Norton Foundry News

NORTON

BETTER SNAGGING WHEELS!

B11 Wheels BN Wheels BD Wheels

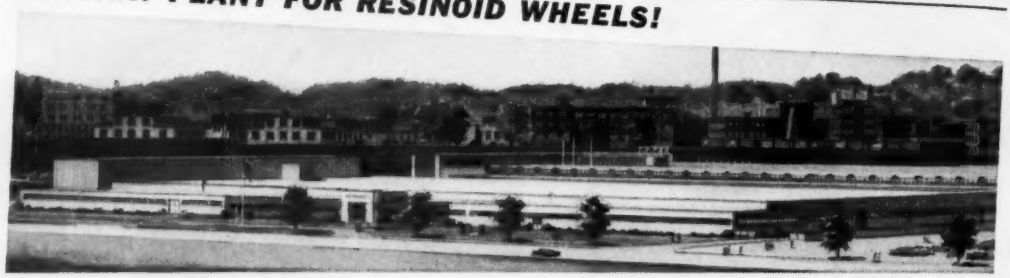
Equipment and quality control in new, multi-million

The great new Norton Worcester Plant No. 8 was built specifically to advance the manufacture and performance of resinoid wheels — the wheels foundries need and use most.

Norton Foundry News

BIG NEW PLANT FOR RESINOID WHEELS!

Norton Foundry News



Equipment and quality control in new, multi-million dollar Plant No. 8 are ultra-modern — maintaining "Touch of Gold" performance at highest efficiency and producing resinoid wheels that remove more metal per dollar and last longer. For example:

- B11 resinoid bonded wheels have more uniform structure and better balance, assuring faster, cooler grinding, plus smoother operation. Available in sizes and types for all jobs — on your swing frame grinders and floor stands down to smallest portables.
- BN and BNA straight wheels, reinforced with glass cloth, are strong and safe, excellent for cutting and notching gates and risers. Made in thinnesses down to 1/16" and 3/32".
- BD and BDA wheels, raised hub type, glass-nylon reinforced, are ideal for many cleaning, slotting and cutting operations.

On-the-job reports of how new Norton resinoid wheels are paying off in ferrous and non-ferrous foundries are in the new report, Norton High Speed Resinoid Wheels for the Foundry, shown here. Your copy is available from your local Norton Representative . . . and is as near as your phone. Call for it today. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

NORTON ABRASIVES

W-1968

75 years of . . . Making better products . . . to make your products better

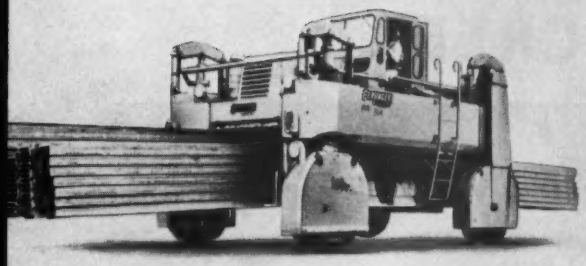
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Circle 615 on Page 53

Circle 616 on Page 53→

TOWMOTOR-GERLINGER

offers you three complete capital-saving services!



1 YOU LEASE *without down payment!*

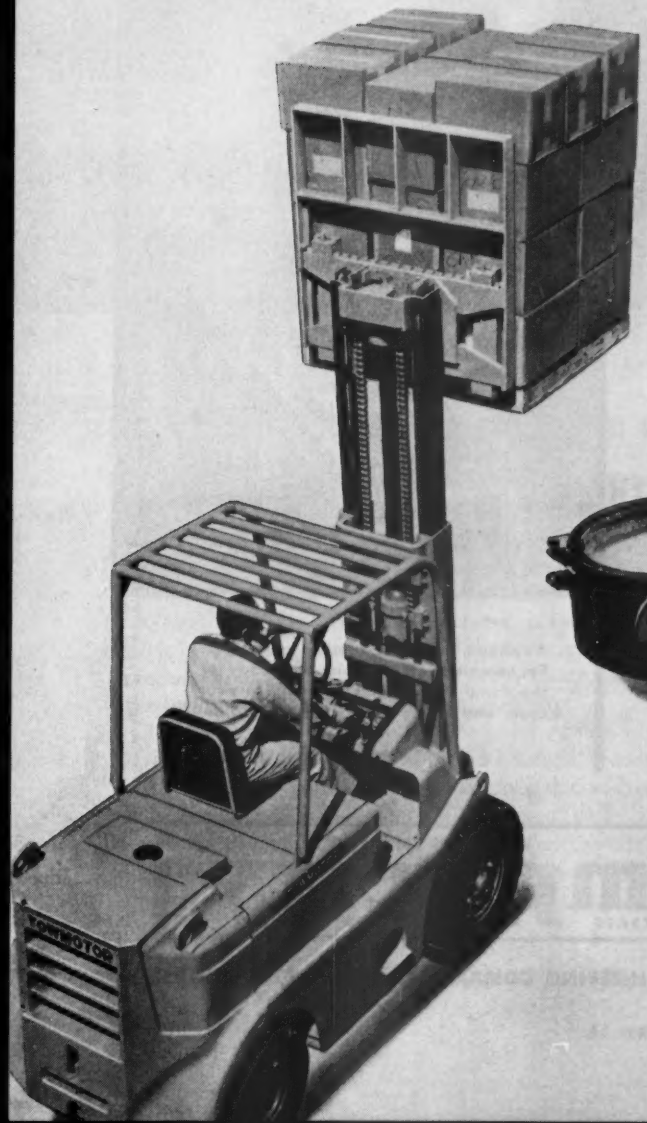
You don't make a *down payment* when you use the Towmotor-Gerlinger Lease-A-Truck Plan. You put T-G equipment to work on a continuous, year-'round basis. You just make a small monthly payment—paid out of savings the equipment produces.

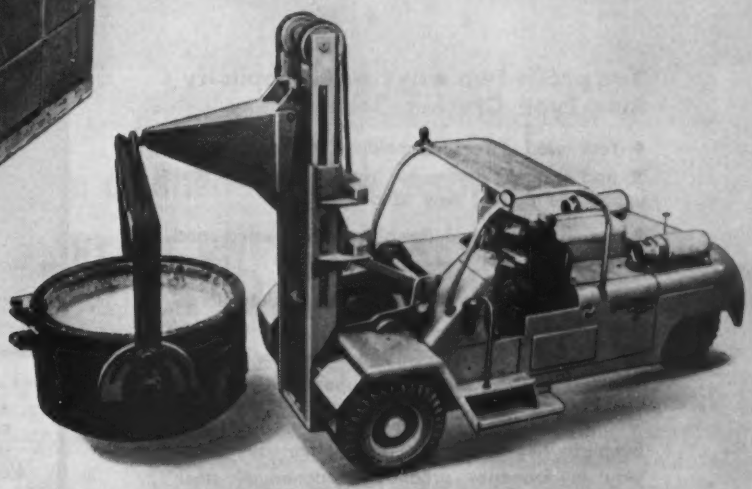
2 YOU RENT *without cash outlay!*

You don't tie up working capital when you *rent* Towmotor-Gerlinger fork lift trucks and material carriers. You put them to work immediately. You start cutting handling costs immediately. Your only cash outlay is one small monthly charge.

3 YOU BUY *and save as you pay!*

You don't pay cash for Towmotor-Gerlinger equipment when you use our low-cost Time Payment Plan. You make reasonable monthly payments. Low interest rates make it easy. Handling economies consistently pay the monthly cost many times over.





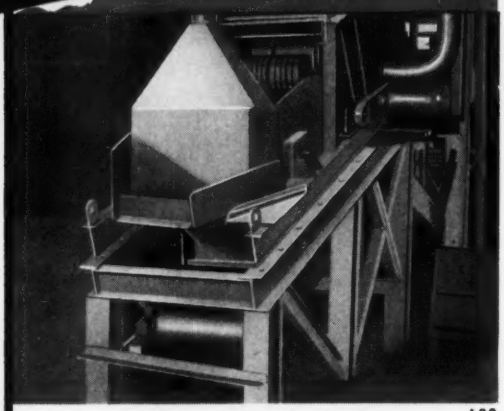
Complete factory-supervised maintenance can be included in *any* of the above plans! For complete information, write Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR -GERLINGER
THE ONE-MAN GANG

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

SALVAGE YOUR VALUABLE MOLDING SAND with a SIMPLICITY RING-TYPE CRUSHER SCREEN



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You profit two ways with Simplicity's Ring-Type Crusher Screens

- Your used core and molding sand is crushed and screened for re-use in one operation, saving the cost of new sand.
- Transportation and dumping costs of used sand are eliminated.

This unit combines the Simplicity heavy-duty vibrating screen with free-turning cast rings mounted over crushing plates. One to three sets of rings can be supplied, depending upon the maximum lump size to be crushed.

Simplicity ring-type crusher screens are paying their way in foundries producing magnesium, steel, malleable and grey iron castings throughout the United States.

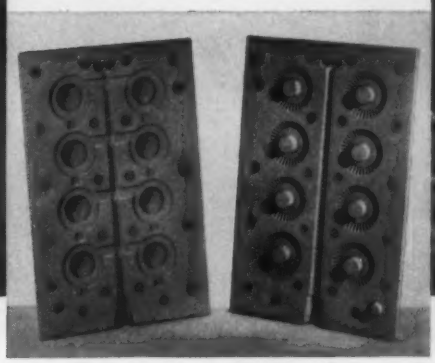
Available in many models and sizes. For complete information write today for the name of our sales engineer in your area; and turn your waste into profits.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.
FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario.
FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND 7, MICHIGAN

Shell molds using hot-processed sand coated with BAKELITE phenolic resin BRR-7151 give excellent surface smoothness and dimensional stability to castings.



for faster production of shell-molded castings . . .

HOT-MIX WITH NEW BAKELITE PHENOLIC RESIN BRR-7151

Since its introduction six months ago, more and more foundrymen are using NEW BAKELITE phenolic resin BRR-7151 for hot processed coated sand. It gives greater production of castings from shell molds and cores and very often a smaller amount of resin is required.

Developed especially for rapid coating of hot sand, BAKELITE phenolic resin BRR-7151 flows around the sand faster thus reducing mixing time. It is a stable novalac, ideal for all types of hot coating equipment. BRR-7151 provides optimum flow for higher shell and core strength, ideal weight pick-up in rapid investment cycles, and optimum green strength on pattern plates. Castings with excellent dimensional stability and surface smoothness are produced.

Union Carbide Plastics Company produces a wide range of top-performing shell molding resins. Technical Service based on expert know-how and many years of experience is offered to foundrymen. For further details, contact the Union Carbide Plastics Company office near you, or write Dept. **AV-52,** Union Carbide Plastics Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

UNION CARBIDE

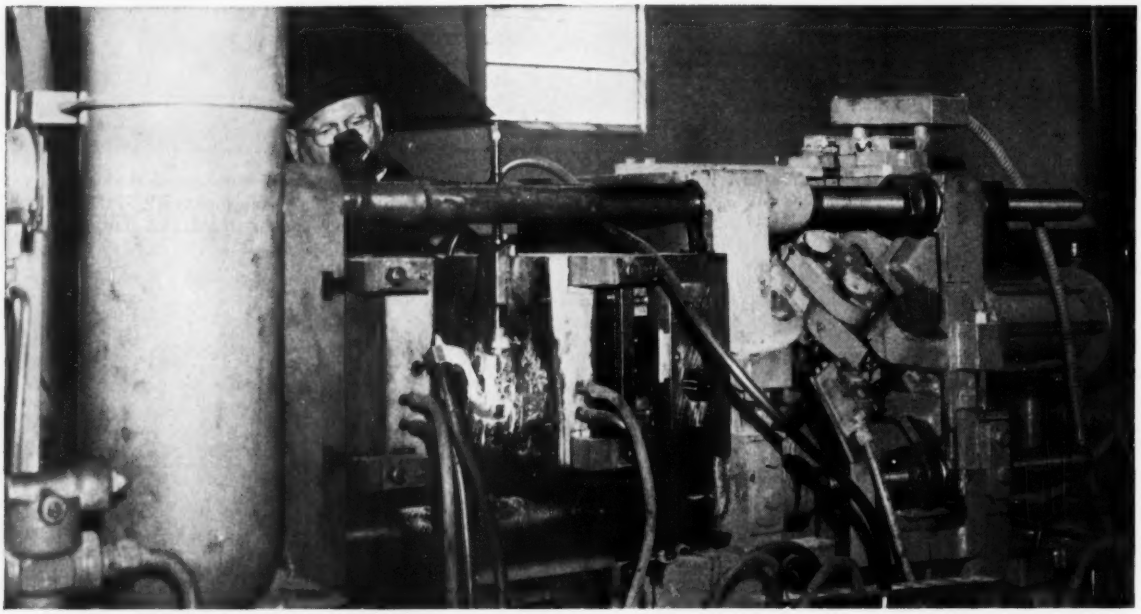
BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation.

Circle 618 on Page 53

SAVE ON SHORT RUN DIE CASTINGS!

CHANGE DIES IN MINUTES!

With D-M-E Standard Unit Dies for Zinc or Aluminum Die Casting



Cut Die Costs and Save Time with Stock Replacement Units

DIE CHANGES that normally take 3 to 5 hours are done in minutes with D-M-E's Standard Unit Dies for zinc or aluminum die casting.

Standard interchangeable Replacement Units are *in stock* now to reduce your die costs and shorten delivery schedules.

D-M-E's Standard Unit Die assembly offers these unique features for added savings in production time and maintenance:

Construction permits complete freedom on *three sides* of the cavity for placement of cores or cooling lines; six sturdy leader pins and bushings provide accurate alignment and trouble-free performance; and "quick change" wedge clamps for positive positioning of each plate.

Standard Replacement Units are quickly positioned in the Unit Die Holder by a precision T-slot in the mating edge of the plates; there is no interference with the cavity layout.

Whether you require rack and pinion or automatic "bumper-type" ejection, D-M-E has a Standard Unit Die to fit the machine.

D-M-E Unit Die Holders are available for Standard 10″ x 12″ or 12″ x 15″ Replacement Units.

Start saving *now* on your short-run die-casting jobs with D-M-E Standard Unit Dies.

SEVEN BRANCHES FOR FASTER SERVICE

Write **TODAY** for Complete Specifications

DETROIT MOLD ENGINEERING COMPANY

DME

- DETROIT: 6686 E. McNichols Rd.—CHICAGO: 5901 W. Division St. HILLSIDE, N.J.: 1217 Central Ave.—LOS ANGELES: 3700 S. Main St.
- D-M-E CORP., CLEVELAND: 502 Brookpark Rd.—DAYTON: 558 Leo St.
- D-M-E of CANADA, Inc., TORONTO, ONT.: 156 Norseman Ave.

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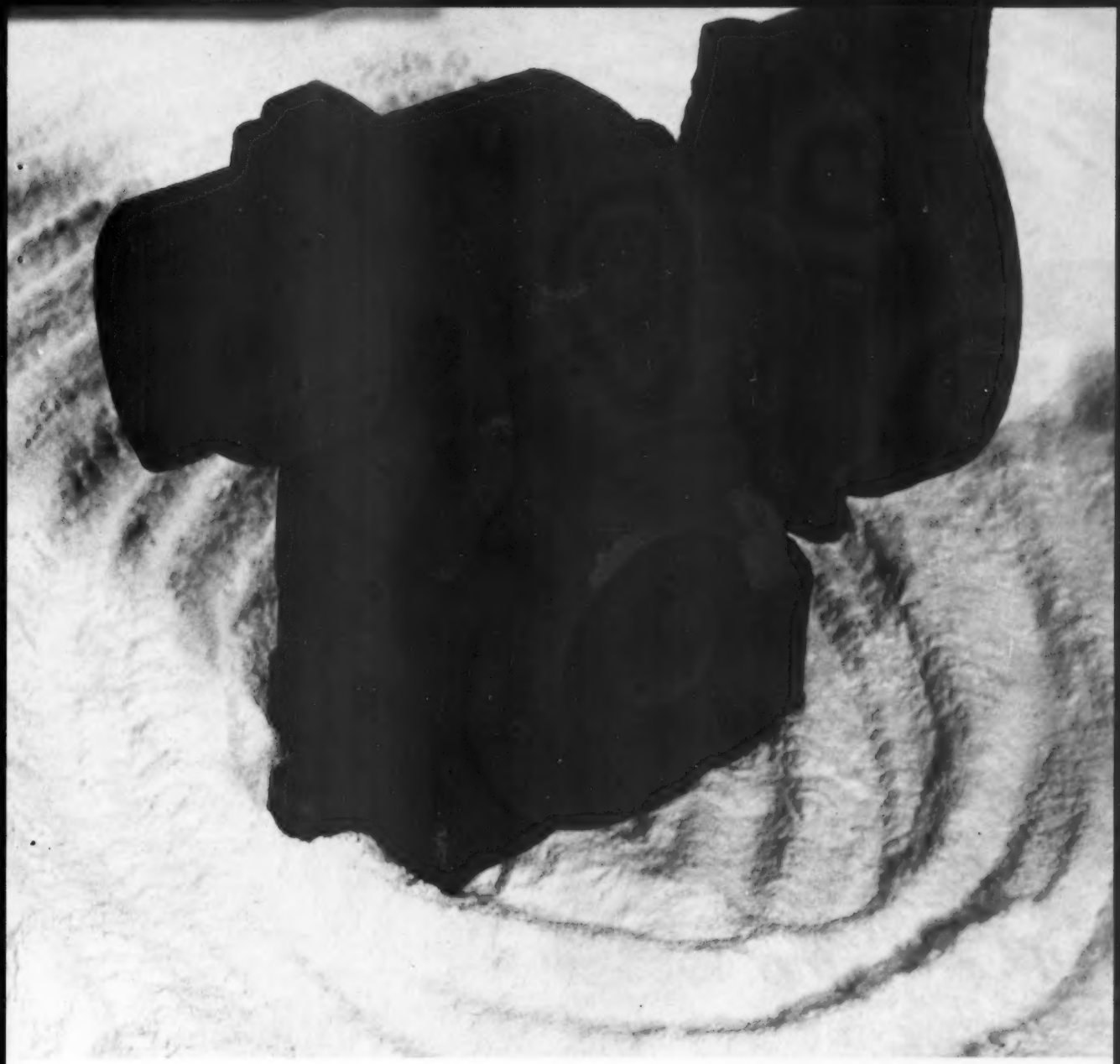


Save baking time,

mold the best quality cores – use...

DEXOCOR®
and MOGUL®
binders

WRITE OR PHONE

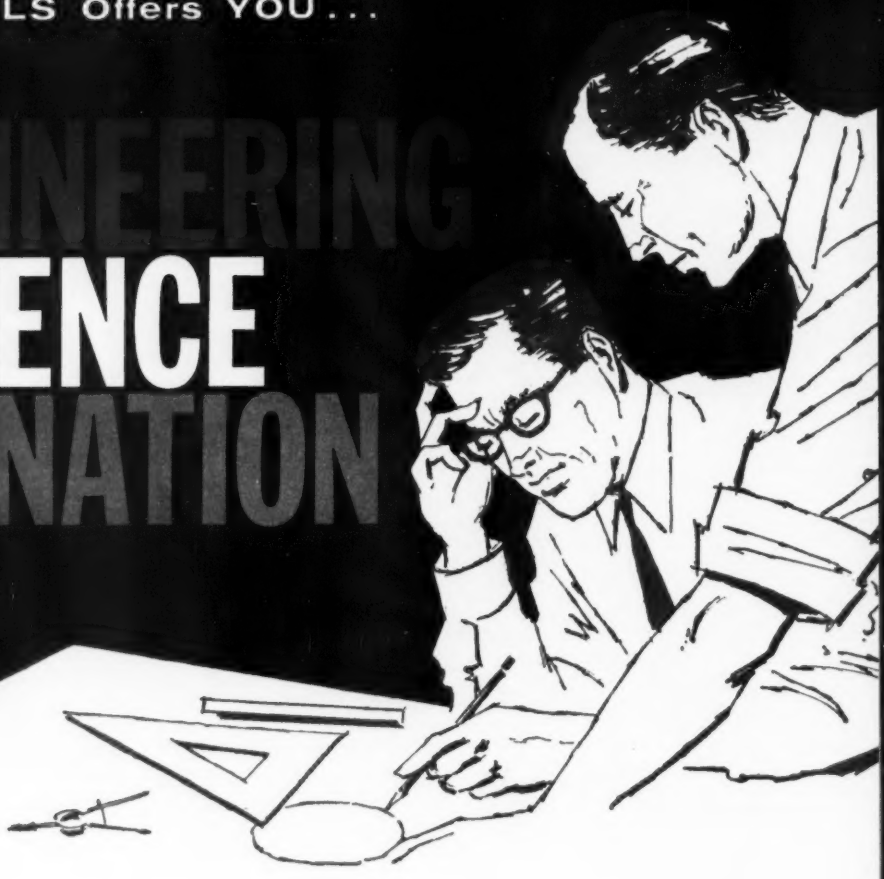
Corn Products for expert technical assistance... helpful data on these fine products for Foundrymen:

DEXOCOR® • MOGUL® • KORDEK • HYDRACOR binders • GLOBE® dextrines.

CORN PRODUCTS DIVISION CORN PRODUCTS SALES COMPANY • 9 East 55 Street, New York 22, N. Y.

BROWN METALS Offers YOU . . .

ENGINEERING EXPERIENCE IMAGINATION

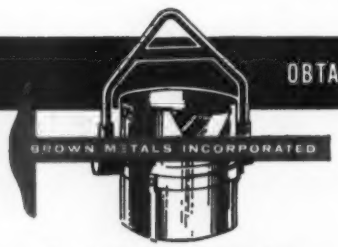


FOUNDRY MELTING EQUIPMENT designed for YOUR foundry

- WATER COOLED CUPOLAS
- 650°F-1400°F BROWN HOT BLAST
- MECHANICAL CHARGERS
- AUTOMATED MATERIALS HANDLING
- HOT METAL HOLDING AND TRANSFER UNITS
- YARD LAYOUT AND STORAGE

Call on us for quotations on any foundry engineering or operations problem — new equipment, modification of present facilities or both. Our services are flexible and designed to produce the maximum savings in capital expenditure and operating costs — no job too large or small. We offer complete erection on a turnkey basis or engineering for a specific project.

OBTAIN MAXIMUM SAVINGS ON MELTING EQUIPMENT — WRITE FOR FULL DETAILS



Foundry Engineering & Operations

BROWN METALS INCORPORATED

300 HURON STREET ELYRIA, OHIO

Telephone FAirfax 3-3291

Circle 621 on Page 53

THE LITHIUM REACTOR

CURRENT INFORMATION ON LITHIUM CHEMISTRY AND METALLURGY

LCA TO MOVE HOME OFFICE

Effective June 15th, the executive and sales offices of LCA will be located at 500 Fifth Avenue, New York 36, N. Y. The former Minneapolis office will be closed and all correspondence should be addressed to the New York office.

PAPER ON LITHIUM'S ALLOYING POTENTIAL OFFERED

A rerun of the popular paper, "Lithium, A Promising Alloying Element," has been made and copies are again available through LCA upon letterhead request.

This paper gives a concise summary of the theoretical concepts of the alloyability potential of lithium with a number of metallic elements as well as a review of the alloy systems that have already been developed on a commercial or semicommercial basis.

Written by an independent authority in the field, the paper gives a factual and unbiased view of the utility of lithium in alloys.

PHASE DIAGRAMS AVAILABLE ON REQUEST

Lithium Corporation has prepared authorized reprints of binary phase diagrams of lithium with other metals. The reproductions are from the McGraw-Hill book by Hansen, "Constitution of Binary Alloys."

The diagrams have been enlarged to fill an 8½ x 11 sheet and temperatures in degrees Fahrenheit have been added for the convenience of operating metallurgists. Original source references are indicated on the individual phase diagrams.

Complete sets, consisting of 15 phase diagrams are now available upon request on company stationary to LCA.

Lithium-Aluminum Alloys Find Wider Applications

New Alloys Utilize Lithium Because of Light Weight and Strength

Mother Nature, in her capriciousness, made lithium the lightest of all metals. Today, design engineers and metallurgists are utilizing this property to their advantage. Because of the ever increasing demands of modern technology, the search for newer, stronger and lighter alloys is endless, particularly when they can withstand reasonably high temperatures. Lithium fits directly into this picture and LCA is happy to work with metallurgists interested in developing new alloys to meet this need.

Alcoa's X-2020, an aluminum alloy containing a small amount of lithium, is finding increasing applications in advanced aircraft and rocketery. This new material surpasses the thermal barrier of other alloys of similar strength by approximately 100° F. Furthermore, because it is some 3% lighter than previously available aluminum alloys, its use will account for substantial reductions in aircraft weight. Lower in cost than any similar alloy, X-2020 makes the production of such aircraft more economical as well.

LCA produces lithium in ingot form as a convenient means of manufacturing such alloys. Master alloys are also available.

The Niagara Falls Smelting and Refining Division of Continental Copper & Steel Industries in Buffalo, N. Y. produces a 5% lithium-aluminum alloy. Controlled addition of this material to die-casting alloys diminishes porosity and reduces the accumulation of aluminum oxide in ducts and channels of induction furnaces. For these advantages, initial addition of ¼ lb of "Falls" 5% lithium-aluminum per 100 lbs of melt is suggested by the company. To produce other alloys, the company suggests higher concentrations of the master alloy.

Kawecki Chemical Company, 220 East 42nd St., New York 17, N. Y. also produces a lithium-aluminum alloy, suitable for use in improving the quality of aluminum products and producing lithium containing alloys. The Kawecki material containing 10% lithium in aluminum, will also provide castings of improved physical properties or can be used to provide lithium to make alloys.

For further information on either of these two master alloys write these companies.

The Lithium Corporation of America, at their new address, is happy to provide information covering the use of lithium as an alloying element for aluminum. For further information, write Technical Service Department.

LITHIUM IN BRIEF

New developments involving lithium are constantly appearing in the literature. Each month some will be repeated here. For further information, write our Technical Service Department.

•

A WADC report on seventeen alloys for brazing titanium indicates favored properties for lithium-silver base filler metals (820).

•

A UK report on brazing titanium with aluminum or silver filter alloys requires fluxes containing 15-20% LiF (1075).

•

A Canadian research paper notes a specific heat anomaly in Li-Mg alloys due to martensitic transformation (2018).

•

Two U. S. patents describe method of manufacture of lithium-ferrite magnet cores for "electronic memory" equipment (322-323).

LITHIUM CORPORATION OF AMERICA, INC.
500 FIFTH AVENUE • NEW YORK 36, N. Y.
NEW YORK 36, N. Y. • CLEVELAND 14, OHIO • CHICAGO 1, ILL. • LOS ANGELES 36, CALIF. • BESSEMER CITY, N. C.

Circle 622 on Page 53

15 WAYS TO BETTER CASTINGS

The immediate answer to producing better castings often lies in the right pattern coating, mold release, core binder or surface spray at the start. We at the Para Products Division, use a simple truism—"It's the result that counts"—which has guided our operations for 21 years in research, development and production of better products to give our customers better results.

FOUNDRIES (Green, baked cores, molds)

Non Ferrous

SUPER PARASPRAY #2—Core and mold surface conditioner quickly provides hard surface, stabilizes moisture, deoxidizes mold cavity. Eliminates porosity, gas holes. Vehicle for application of refractories.

FLUORINATED PARASPRAY #3—High fluorine content provides strong flux for the surface of magnesium and also some difficult aluminum castings.

Ferrous

INDUSTRIAL PARASPRAY #4—Inexpensive surface conditioner, locks down surface grains, prevents gain or loss of moisture, prevents washing and surface defects. Carrier for zircon, silica.

HYTEMP—Designed for cores and molds which must withstand highest pouring temperatures. Sprays on, ignites, or air dries readily.

LIQUID PARTINGS & RELEASE AGENTS

KENSLIP—Liquid parting, provides long-lasting microfilm coating for normal and high volume molding. Eliminates surface friction, giving greater accuracy and pattern detail. Draws clean. Type "A", solvent based. Type "E", non-flammable emulsion.

PARALESE—Silicone mold release, for shell molding, die casting, for deep draws and slight draft. Fast "wetting" action, heat resistant. Carbon build up, mold cleaning reduced to a minimum. Available in bulk or aerosal—solvent or water based.

CO_2 PROCESS

PARASET CO_2 BINDER—Requires only 3% to 4% maximum, consistent uniform quality, minimum mulling, quick initial set strength, custom collapsibility. 2 grades (with or without Color Indicator): HC when high temperatures and collapsibility are dominant factors; General Purpose recommended for 80% to 90% of normal foundry operations.

CO_2 SHELL COAT—Provides strength and fine finish only where required—on the surfaces. Seals surfaces against elements affecting change in moisture content. Adds great strength and stiffness to long delicate or fragile core surfaces. Sand will not rub off edges or thin sections. Insures detailed reproduction and precise dimensional accuracy. Takes only seconds to apply by spraying or dipping. Refractory vehicle.

PERMANENT MOLD AND DIECASTING

BONISPRAY—For coating metal molds and dies for the casting of all metals and alloys except steel. Prevents sticking of metal, protects molds, produces smoother, cleaner surfaces. Up to 300 zinc base castings from one application. Paste dilute with water.

PATTERN SHOPS (wood, metal, plaster)

SUPER PARACOAT—Pattern coating, easily applied to patterns and core boxes. Dries quickly providing a glossy, hard coating. Seals surfaces against warpage and corrosion. Stands up well under sandslinger and air blowers.

PARAPLY—Lacquer finish, a superior replacement for shellac which lasts longer and therefore costs less. Excellent for metal match plates.

PLASTER PRIME—Penetrates deeply, dries rapidly to seal plaster and gypsum patterns or molds. Speeds production by eliminating delay of oven drying. Prevents calcination and insures detailed reproduction.

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INSULSLEEVES—Perlite insulated risers provide hotter and more uniform feed. Result: smaller risers, sounder castings. Sizes 1½" to 4½" I.D. 3" to 12" length.

ZIRCOTE AND SILCOTE—Ready to use resin-based liquid refractory coatings containing zircon or silica flour which produces smooth steel, gray iron, and bronze castings free of scabbing and burn-ins.

PARASOLV "A" & "C"—Multi-purpose solvents for use with PARA PRODUCTS and general cleaning.

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PARA PRODUCTS DIVISION

FOUNDRY RUBBER INCORPORATED

Dept. J—5200 River Road Washington 16, D. C.

Circle 623 on Page 53

■ The direct-reading spectrometers at Bridgeport Brass Company plants are used for fast, accurate alloy composition analyses. These units, integrated with pneumatic sample tube systems, make possible complete quality-control analyses in a matter of minutes from the time the samples are taken until the reports are telautographed back to the melt floor.

Results—obtained quickly and economically by direct reading spectroscopy — permit Bridgeport Brass Company plants to maintain elements within alloy composition limits.

"NATIONAL" GRAPHITE helps speed alloy composition analyses

"National" graphite rod grades AGKS and SPK are being used for the analysis of 95 to 100% on all castings from furnaces at the Bridgeport Brass Company's copper base alloy and aluminum plants. Grade SPK, a newly introduced product, is providing excellent reproducibility and has cut running time approximately five hours/week on troublesome jobs. It is preferred on samples containing over 90% copper to provide hotter discharges which rapidly vaporize the metal, providing faster analyses. In addition, the improved texture and density offer better machinability and more "shots" per rod.

Whether you use rods, pre-forms or powders, specify "National" for your spectroscopic work.

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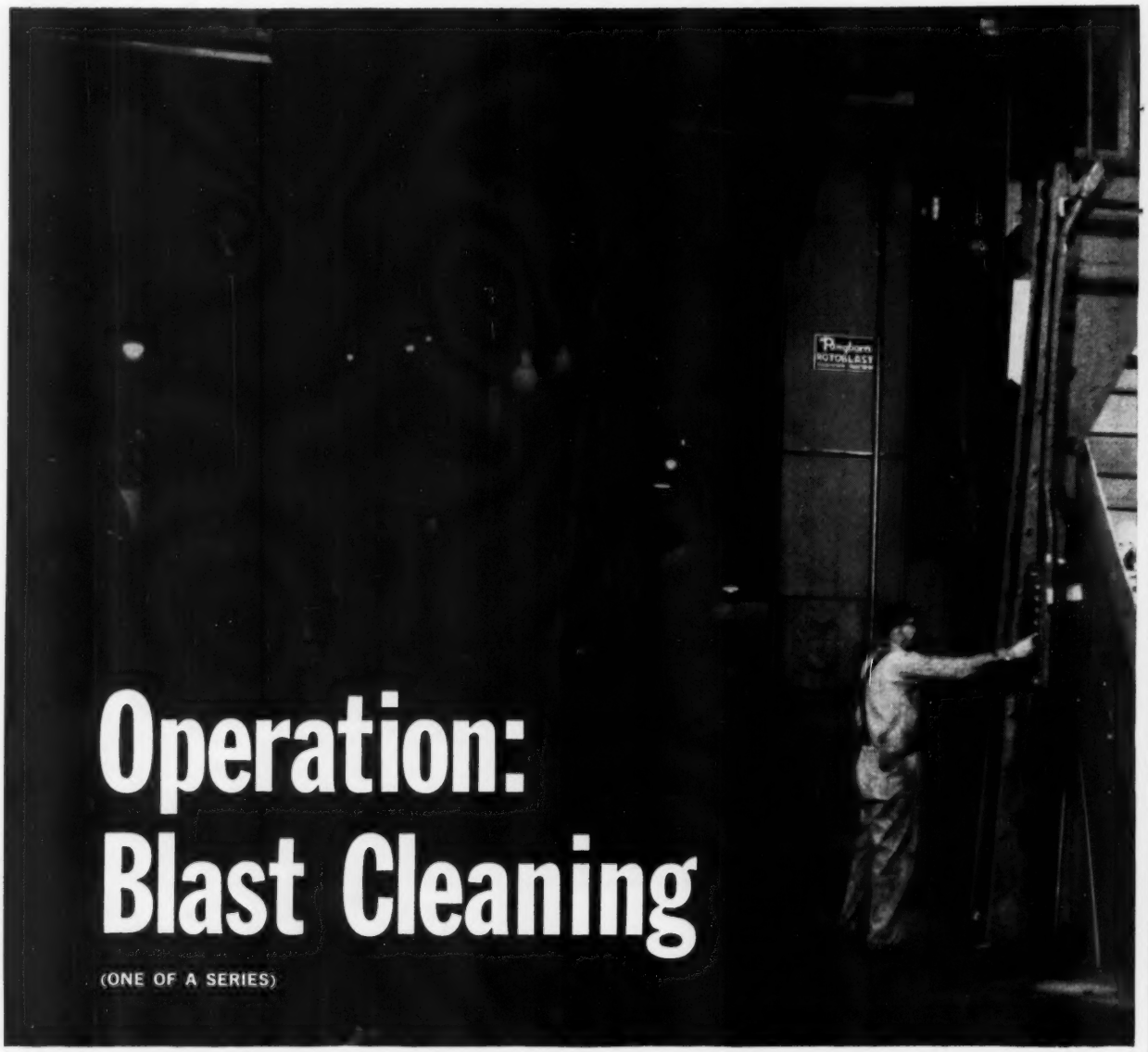
Division of Union Carbide Corporation . 270 Park Avenue, New York 17, New York
IN CANADA: Union Carbide Canada Limited, Toronto

UNION CARBIDE

Circle 624 on Page 53



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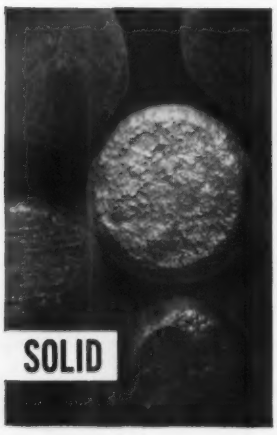
(ONE OF A SERIES)

Pangborn Rotoblast proves itself again



Carrier Corporation, Syracuse, N.Y.—Pangborn Rotoblast cleans so quickly it has cut cleaning department labor costs 30% to 40% . . . saving $15,000 a year.

Master Electric Company, Dayton, Ohio—Two 12 cu. ft. Rotoblast Barrels with automation reduce labor costs by 50%—save $15,000 a year in manpower alone! Clean 33 tons of gray iron castings a day with ease.

Meadville Malleable Iron Co., Meadville, Pa.—Pangborn Roto-

And Rotoblast Steel Abrasives

In foundries, forges, steel and metal working plants all over America, premium quality Rotoblast Steel Shot and Grit are replacing other metal abrasives as they *prove* their ability to blast clean at lower cost. Lansing Drop Forge Co.—a typical

Typical Rotoblast Barrel, Ft. Pitt Steel Castings Co., McKeesport, Pa.

...and again...and again...and again!

blast cut 24 man-hours daily to 15 . . . cleans loads three times as large in half the time.

Ingersoll Rand Co., Painted Post, N.Y.—Pangborn Rotoblast cleans 74,000 lbs. of castings per day, cuts cleaning time in half and substantially reduces costs.

Buckeye Iron & Brass Co., Dayton, Ohio—Pangborn Rotoblast is automated to reduce labor requirements even further, cuts 15 minutes blast time to just 4½.

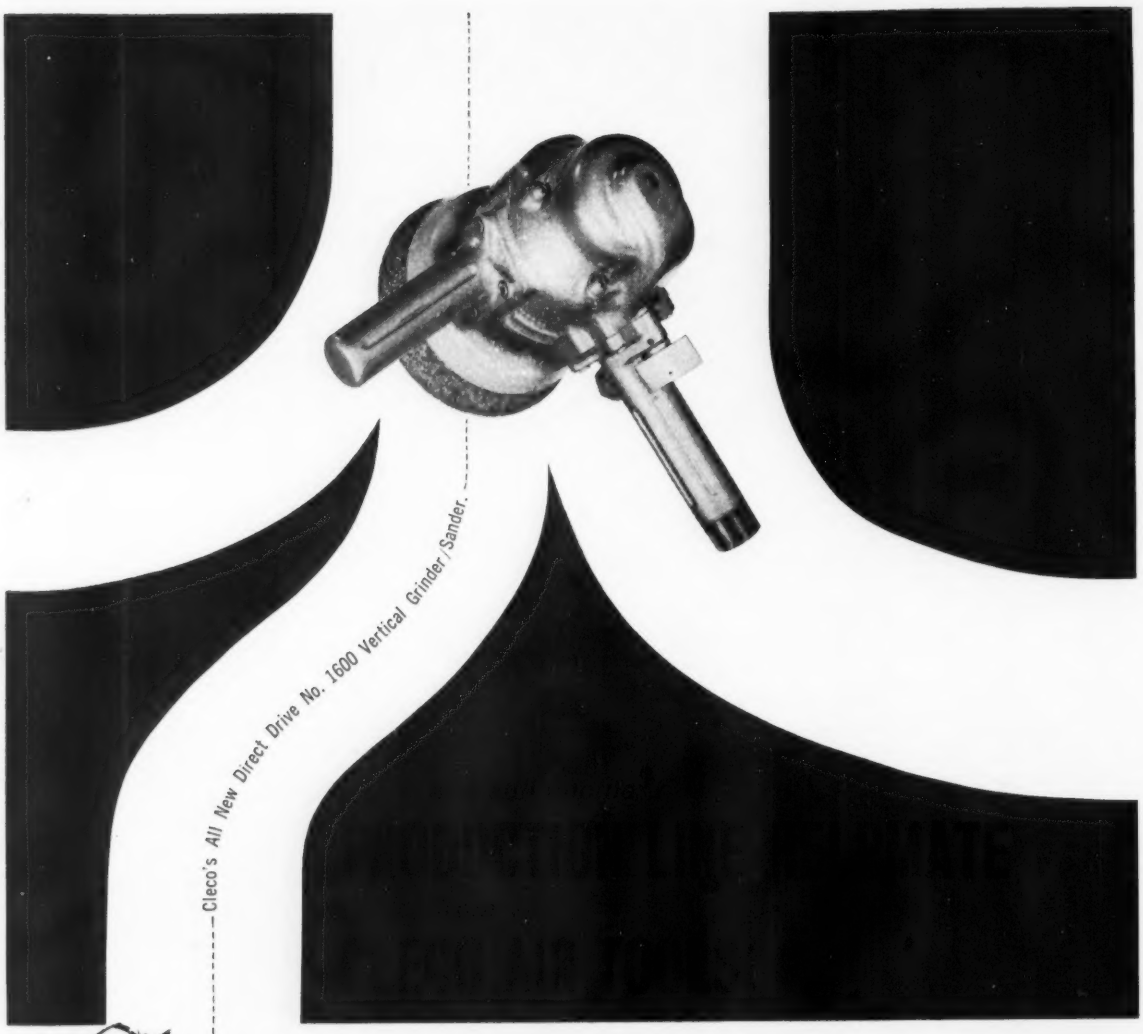
prove their value, too!

user—switched to Rotoblast S-390, cut abrasive cost by 23%. An Ohio foundry cut shot consumption from 27 lbs. per wheel hour to 7.8 lbs. with Rotoblast S-330. Let us show you what Rotoblast abrasives will do for you.

Results like these explain why two of the world's leading automotive manufacturers have just ordered *nine* 32 cu. ft. capacity Rotoblast Barrels! If *your* problem has to do with blast cleaning, talk to your Pangborn man or write PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *"Come to Pangborn" equipment display at Philadelphia Foundry Show, May 9-13.*

Pangborn
OF HAGERSTOWN

Circle 625 on Page 53



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This direct drive—governor controlled, vertical grinder/sander is a production booster. It maintains a safe high speed with medium-heavy work loads (where most of your grinding is rated). Cleco's No. 1600 Grinder has a high-strength, heat-treated aluminum casing and a built-for-safety, heavy spring governor. Its casing is constructed in one-piece, giving you a light weight tool that can take the bumping and dropping you know it will receive. This feature plus the tool's inherent low maintenance features will endear the No. 1600 Grinder to every maintenance department.

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IN CANADA: Cleco Pneumatic Tool Company of Canada, Ltd.
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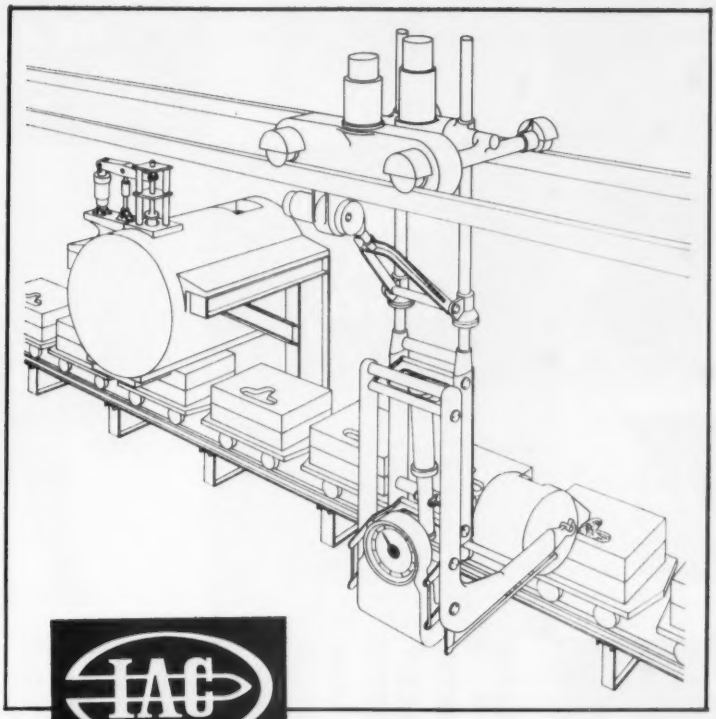

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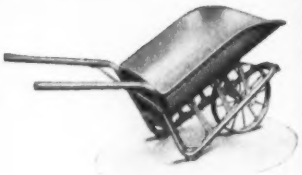
Circle 627 on Page 53

Standard type "S" flask pin

"ENGINEERED TO THE JOB" DESIGN

No. DF4-S heavy-duty foundry barrow

COST LESS PER YEAR

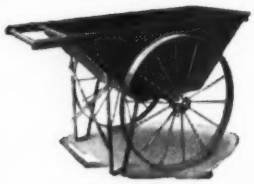


No. 102-S charging wheelbarrow

No. D4W wheelbarrow for sand, coal, etc.

WORLD WIDE SERVICE

No. 626-PR cart with pneumatics



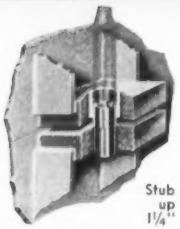
No. 47 casting cart

Heavy-duty cart with "3 point landing"

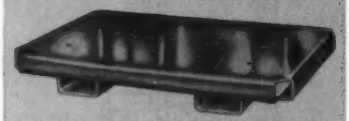
IT PAYS TO SPECIFY

Sterling

FOUNDRY EQUIPMENT



Stub pins up to 1¼" dia.

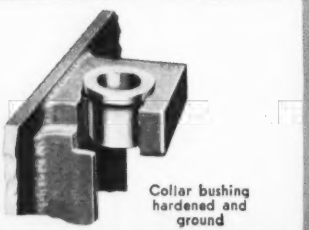


Perm-alum squeeze-in bottom board

No. 50 slag buggy

No. 110 core truck

Sterling flask clamp



Collar bushing hardened and ground

Standard hardened steel bushing

BACKED BY 50 YEARS OF EXPERIENCE

Style "X" core plate

UNEQUALED REPUTATION FOR STERLING QUALITY

No. 160 heavy-duty casting truck

No. 100 barrow for cores

Circle 628 on Page 53

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Milwaukee 14, Wisconsin, U.S.A. • Founded 1904 as Sterling Wheelbarrow Co.

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WHEREVER METALS ARE CAST . . . FOUNDRY
JUNE 1960

Looking Ahead

At the recent AFS Congress in Philadelphia FOUNDRY asked a number of foundrymen for their opinions on current and prospective business. A tabulation of the replies from more than a hundred individuals provides some interesting data.

About 60 per cent of these foundrymen said that business so far this year has been as good as or better than they expected.

Nearly 80 per cent of them said that their current operations are equal to or better than the rate a year ago.

More than 80 per cent of the foundries expect second-half operations to match or exceed first quarter production. This is surprising because the first six months usually is the better of the two half-year periods.

Looking to next year, more than half of the foundrymen said they anticipate increased business, 23 per cent expect a stand-off with 1960, only 4 per cent see a decrease, and the remainder are undecided.

Admittedly, because of its limited size this sampling probably should be considered only a straw in the wind. But because the persons queried happened to provide an excellent cross section of the industry on the basis of foundry size, type, and geographical location, added weight is given to the following conclusions which can be drawn from this study:

1. Conditions are better than would be surmised from the disappointment voiced by those who assumed that the optimistic forecasts for the decade of the 60s were to take full effect on Jan. 1.

2. Most foundrymen are sure of good business for not only the remainder of this year, but also for 1961.

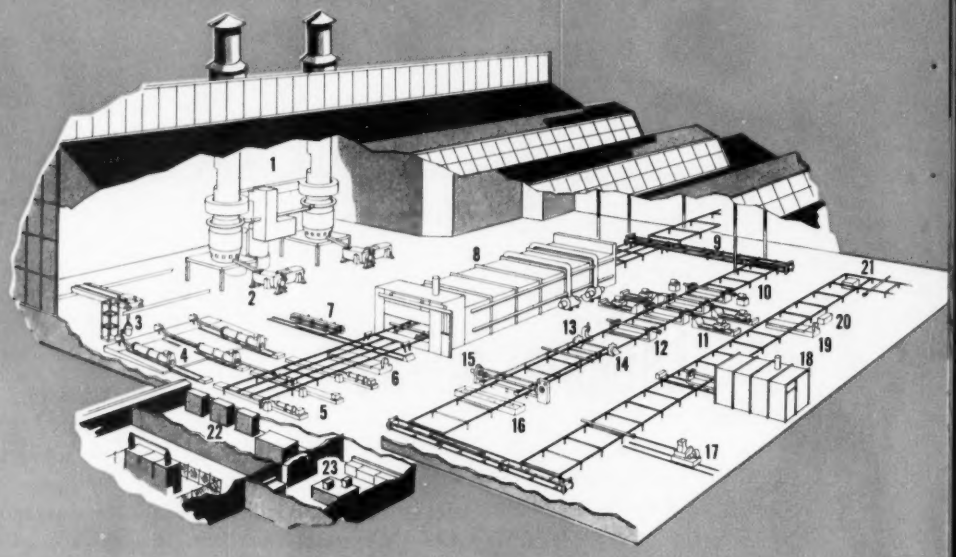
A clue as to why industry generally has not extended the rebound that followed the end of the steel strike is contained in a recent business survey report of the National Association of Purchasing Agents. This report explains that inventories were replenished much faster than anyone anticipated and that availability of most materials and strong competition will encourage buyers to hold inventories to immediate needs.

The many underlying factors now supporting business as a whole at an active pace should result in 1960 being a good year that will disappoint principally those who were boom-minded. For foundries it will mean that those who understand the need and the means for effective selling in both good times and bad will reap the greatest reward.

William G. Reese

Editor

NEW PIPE PLANT... Meets Need of Changing Market



Centrifugally-cast iron pipe is being produced in a plant previously used for casting railroad car wheels. The reasons for the change are discussed and a new plant operation described

● CONVERSION of a car wheel foundry to a cast iron pressure pipe plant and creation of a company division for the production and sale of that pipe is the nut-shell story of adaptation to a changing market. Starting in 1922 the Griffin Wheel Co. produced cast iron car wheels at Council Bluffs, Iowa. Nine major railroads come into that city and most of them at one time maintained shops for mounting wheels on axles. In recent years those shops gradually were consolidated into maintenance shops in other sections of the country.

Coupled with that movement was a growing demand for cast steel wheels, and Griffin's development of the EQS (electric quality steel) Wheel which is cast by forcing molten steel by air pressure into permanent graphite molds has helped meet that demand. The company's five steel foundries and five gray iron foundries located elsewhere in the United States and in Canada are better situated to supply wheels to the railroads' consolidated wheel-mounting shops.

What to do with the Council Bluffs plant? It has 95,000 sq ft of building area plus a separate office building on 19 acres of land. Nine railroads in addition to truck carriers offer excellent transportation service in the 11-state area surrounding the plant site.

A company study of this midwestern territory showed a plentiful supply of water which is a critical commodity in the development of any area. Other factors also pointed to a high growth potential for industrial, commercial, and residential buildings. Those buildings must be supplied with water, and only three cast iron pipe plants existed west of the Mississippi River.

By reasoning back through these points it was easy to see that room existed for a fourth pipe plant west of the Mississippi. Because cast iron pipe is a more or less permanent product (communities in the United States have century old pipe in service) its economical production and sale needs an expanding market rather than a replacement market.

Because studies showed the probability of an expanding market, the Griffin Pipe Division of Griffin Wheel Co. was created, and conversion of the Council Bluffs plant into a modern pipe producing facility was begun in April, 1959. On March 25 this year the plant was in full production of 20-ft lengths of pipe with diameters of 4 to 12 in. by the Delavaud process of centrifugal casting. The complete manufacturing process is highly mechanized.

Pipe Molding—Molds for the pipe machines are machined in one piece from SAE 4140 low-alloy steel. They are shaped like a thick-walled length of pipe, having an enlargement at one end to form the bell of the pipe and a lip around the periphery of the bore at the other end to retain molten metal during the mold spinning operation. The molds must be quite accurate di-

KEY TO SCHEMATIC DIAGRAM

1-Griffin Hot Blast Cupolas
2-Holding Ladles
3-Transfer Ladle
4-Delavaud Casting Machine
5-Pipe Extractors
6-Weigh Scale
7-Transfer Car
8-Annealing Furnace
9-Pipe Transfer
10-Bell and Plain End Grinders
11-Internal Grinders
12-Cut-Off Machine
13-Brinnell Hardness Tester
14-Pipe Sorter
15-Hydrostatic Test Press
16-Pneumatic Test Press
17-Cement Liner
18-Paint Booth
19-Weigh Scale
20-Pipe Stenciler
21-Direction Positioner
22-Electrical Control Center
23-Quality Control Laboratory

Pipe casting machine operator places a shell core in the bell end of the mold. It is held in position by a steel back-up plate and wedges. Control panel for the automatic machine is above operator's head

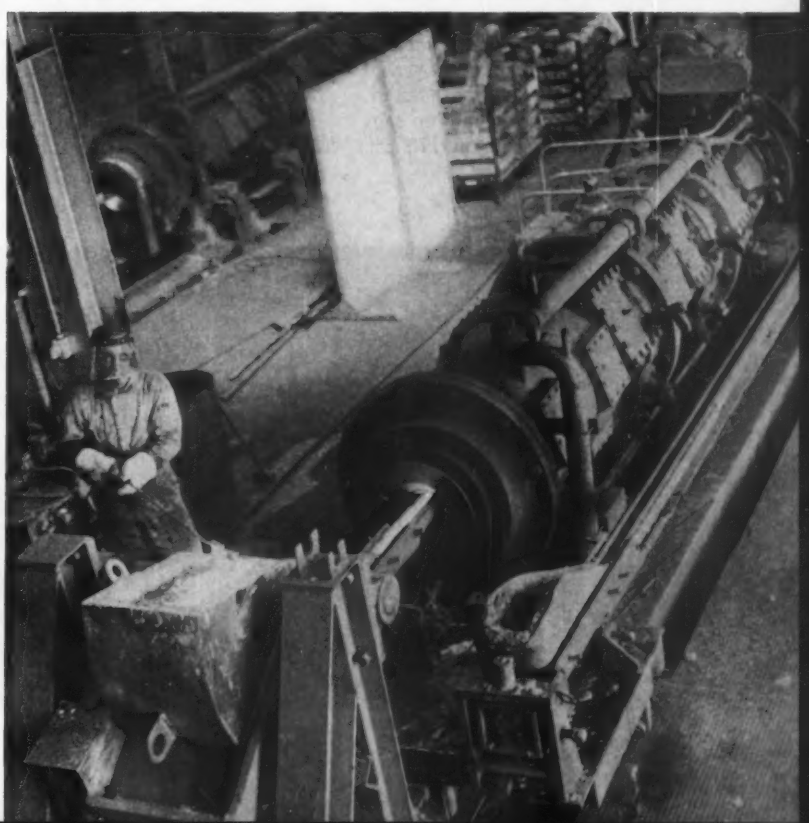
Iron enters far end of rotating mold from trough fed by an automatically tilted ladle. Pouring stops when the mold moves back to the end of the trough. Second trough, right, helps speed pipe production

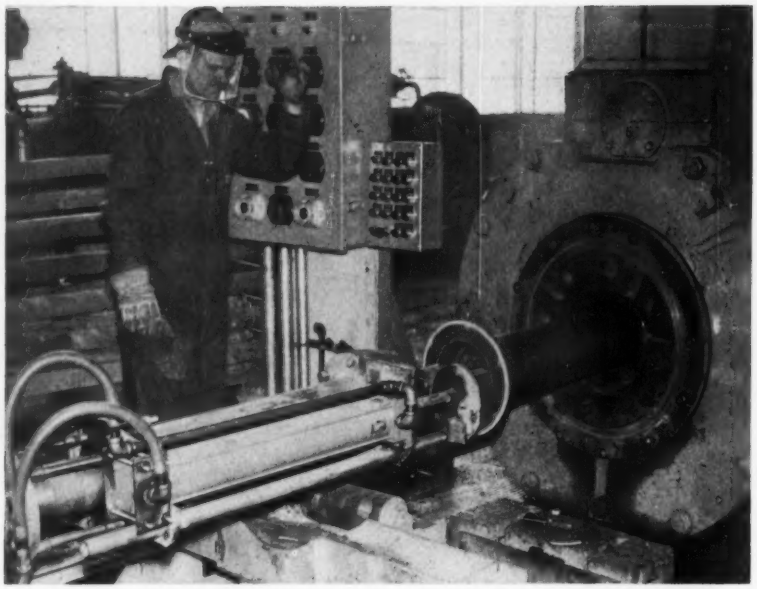
By ROBERT H. HERRMANN
Associate Editor

mensionally. The surface finish of the bore, however, must not be too smooth, otherwise slippage will occur between the spinning mold and the molten metal. This can result in surface defects which are cause for rejection of the pipe. Fluidity of the iron and speed of mold rotation also affect slippage. The three factors are interrelated and must be controlled closely for satisfactory pipe production.

The interior surface of pipe molds used at Griffin has a pebbly finish to help reduce slippage of the molten metal. The molds are spun at a speed of 1175 sfpm which means that revolutions per minute must be adjusted for the different diameters of pipe made. For instance, the mold for 6 in. pipe is spun at about 740 rpm and that for 12 in. pipe is spun at about 370 rpm.

Pipe production facilities consist of three water-cooled, centrifugal casting machines into which molds are mounted horizontally. The molds are spun by electric motor.





When the back plate holding the core is removed, a pipe extractor travels into position, grasps the pipe and pulls it out of the mold

Rate of water flow through each machine is determined by the amount of heat developed in the mold and is governed by temperature of the water measured as it enters and leaves the machine. Ingoing temperature is closely controlled with automatic devices. Water in the closed system is circulated through a cooling tower and is treated to prevent formation of scale in the molding machine.

Each molding machine is mounted on wheels and propelled over 20 ft on rails by a hydraulic cylinder. The three machines operate on separate hydraulic systems at 175 psi.

At the beginning of a molding cycle the casting machine operator places a resin-bonded shell core in the bell end of the mold. It forms the inner surface of the bell and also the bolt holes in the flange if mechanical joint pipe is being made. The core is held in position by a steel back-up plate and wedges driven into U-shaped holders.

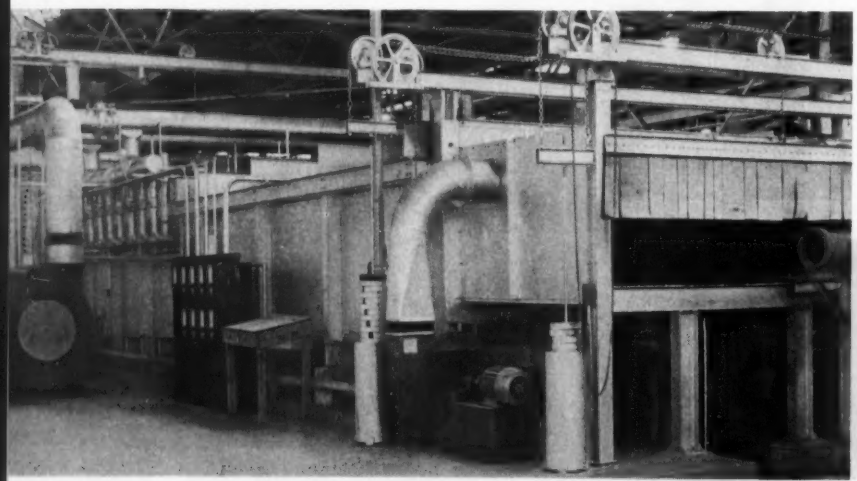
Automatic Operation—The machine operator pushes a button to start the automatic molding operation. The mold starts to rotate and the machine moves along the rails to the pouring position. As it does so the bore of the mold surrounds a long, narrow pouring trough. Limit switches stop lateral movement of the casting machine when it is in pouring position. At that time a ladle holding iron, automatically is tipped by electric motor and quadrant gear drive. The ladle is pivoted at the spout. Molten iron runs over a cast iron pouring lip into a cast iron downshoot which directs the iron down the trough.

At the end of the trough the iron is deflected to the side of the mold at the 5 o'clock position. The mold is rotating in a clockwise direction and thus carries the metal under the trough. Metal first enters the mold at the bell end, and when sufficient has been deposited, the hydraulic cylinder begins to move the machine away from the end of the spout so that hot metal is delivered along the length of the mold.

When the spout is about 2 ft from the straight end of the mold the wheels of the machine at the bell end ride up on a step in the tracks, making the mold level. The machine proceeds another 1½ feet and stops, allowing surplus metal to flow out the straight end of the mold over the retaining lip. After this momentary hesitation the machine continues its travel until it reaches the starting position, at which point the mold rotates until the pipe has solidified.

An air cylinder pushes the trough to the side of the casting machine path, pushing a second trough in position simultaneously. A worker removes the splinter of iron remaining in the trough and brushes the cast iron segments lining the trough with a graphite-water slurry. The use of two troughs and a pipe extractor permits increased production of pipe per machine.

Use Pipe Extractor—With the machine back in starting position and mold rotation stopped, the machine operator removes the back plate holding the shell core and



Pipe is annealed in a 103-ft-long gas-fired furnace. The cycle time through heating, soaking, cooling zones is 1 hr 20 minutes

Specially-designed grinding machines on each side of the pipe-carrying rails grind the inside of the pipe. Each machine grinds half the length of the pipe

presses a button to actuate the pipe extractor. The carriage for this device is mounted on wheels and is propelled along a way by a motor-driven endless chain. Take-up reels supply electric and compressed air lines to the unit. Gripper jaws at 120-degree intervals on a heavy rod are forced outward or inward by an air cylinder.

The rod, with gripper jaws retracted, moves into the bore of the pipe. The jaws are forced outward to grip the pipe which is pulled back, and as the pipe is drawn from the mold it is supported by spool rollers mounted at about 6-ft intervals on the endless chain. With the extractor at the end of its travel, the gripper jaws are released and an air cylinder ram pushes the pipe free of the gripper rod.

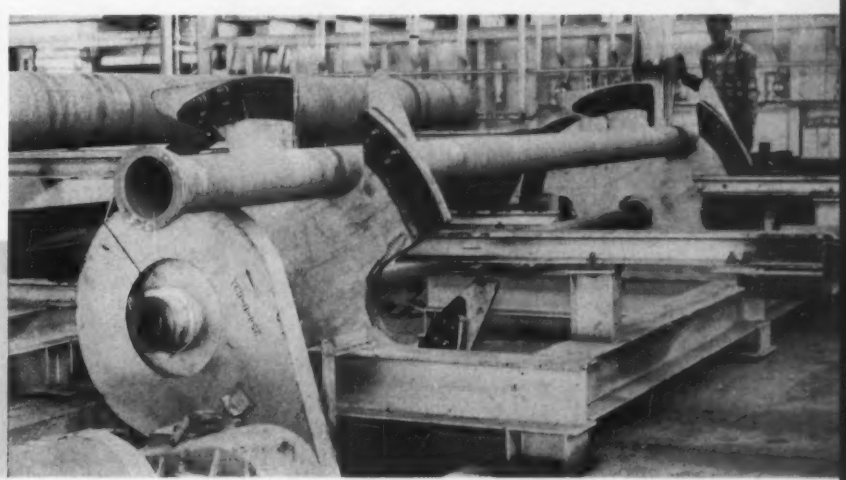
At this point the pipe is lying under four rails on which pipe produced in the three machines is inspected and weighed and on which it rolls to the annealing oven. Four arms pivoted by air cylinders push the pipe off the grooved roller stools to other curved arms which raise the pipe to the rails above. From the moment the molding machine operator pushes the button to actuate the pipe extractor, succeeding operations to the point of placing the pipe on the rails are performed automatically in sequence.

Each section of pipe is stopped on a scale section of the rails where it is gaged and weighed. The 20-ft lengths of pipe of a given diameter have different weights and wall thicknesses depending on the service class into which the pipe falls.

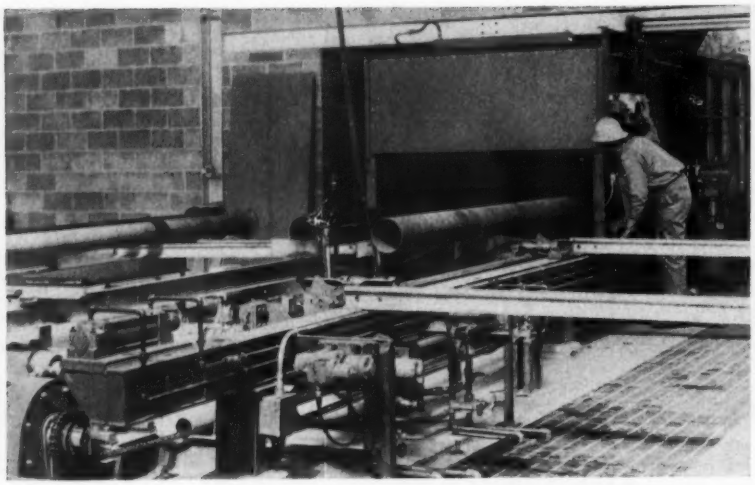
If the weight and thickness of pipe are out of tolerance, the quality control inspector at the weighing station can adjust the rate of tilt of the quadrant ladle, governing amount of iron poured into the mold. This is done through a graduated control at the weighing station. The molding machine operator adjusts the speed of mold rotation to that which is required for various sizes of pipe.

Heat Treatment—Residual heat in a length of pipe is about 1100° F as it enters the 103-ft-long, gas-fired annealing furnace. High-chromium alloy fingers on two endless chain conveyors roll the pipe through the furnace on silicon-carbide skids. The pipe is brought to 1720° F in the heating zone, passes through the holding or soaking zone and finally into the cooling zone, all subject to automatic temperature control. Designed for natural gas, this furnace is equipped with a standby propane gas system for use during those periods when natural gas supply is restricted.

As the pipe emerges from the furnace after 1 hr 20 minutes, it is rolled up inclined rails by fingers on two chain conveyors. The pipe cools here and is kept rolling so it will



A pipe sorter, consisting of two large, slotted wheels, puts small diameter pipe on lower rails and large diameter pipe on top rails



A car carries two lengths of pipe into a painting booth. The interior of one and the exterior of the other are coated with a bituminous compound

not get out-of-round. At the top of the inclined rails a length of pipe trips a limit switch as it rolls to saddles on a chain roller conveyor. After a short, pre-set time interval the conveyor moves a predetermined distance to bring the pipe to another line of rails on which the pipe is cleaned and tested.

Air-cylinder-operated pivot arms push pipe from the transfer conveyor to the rails of the cleaning-inspection line. The pipe is permitted to roll to either of two sets of machines which grind the inside of the pipe. An operator manipulates pushbuttons actuating hydraulic cylinders that power pivoting arms for lowering pipe from the rails to powered wheels. These wheels rotate the pipe. A specially designed grinding machine is positioned at each end of the pipe. The machine incorporates a grinding wheel at one end of a 12-ft shaft. Each shaft is driven by an electric motor mounted on a small car propelled along rails by a second electric motor. The grinding wheel end of the shaft is supported by a roller until the car pushes it into the end of the pipe.

Grinding Is Automatic—The operator starts a complete automatic cycle in motion by the pushing of a button. The first shaft grinds just past the center of the pipe then reverses its travel. The other machine grinds the other half of the pipe similarly. Water is directed into the pipe to cool the grinding wheel and to flush out waste products of the grinding operation.

The pipe is raised to the rails automatically and proceeds to the next station where touch-up grinding is performed on the flange with portable pneumatic grinders and wire wheels. The holes in mechanical joint pipe are gaged and checked. At the next work station the pipe is lowered to powered wheels and rotated while the straight end is trimmed with a cut-off wheel and the inside and outside edges smoothed with portable tools.

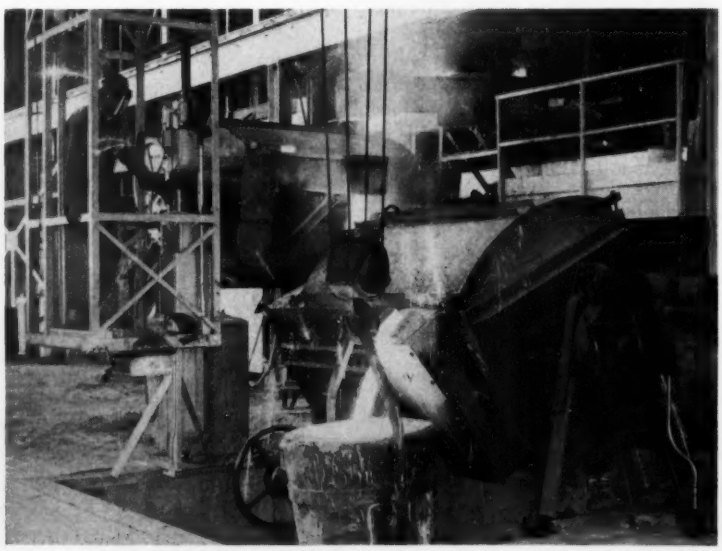
Pipe is raised off the rails at this station by short grooved rollers elevated by air cylinders. The pipe is passed to a Brinell testing machine located on the production line. Maximum acceptable hardness is 207 Bhn with a 1500 kg load.

When returned to the rails the pipe rolls to a sorting device which puts smaller diameter pipe on a lower set of rails and larger diameter pipe on rails at a higher level. Sorting is done by two, 5-ft diam slotted wheels. Small diameter pipe rolls to the bottom of the slots and is carried past the upper level rails. Larger diameter pipe enters the slots only part way and is picked off the wheel by the upper level rails. Pipe rolls to the far end of the rails where it is held by air cylinder-released stops. Pipe is kept in batch lots by size from this point through additional processing to shipment.

An air actuated elevator at the end of the two-level segregation rails permits pipe at the upper level to roll across to a high pressure water testing device. Pipe at the lower level rolls to the elevators to be raised for feeding to the pressurized water testing unit.

Individual lengths of pipe are rolled to holders of the testing machine and end seals clamped in place by a hydraulic cylinder. Water is pumped in the pipe at one end and a pressure of 500 psi applied, and automatically held at that pressure for a predetermined time. After the test the pipe rolls to another trans-

Iron is injected with powdered carbon in the upper forehearth, desulfurized in the lower forehearth, then tapped to transfer ladles



fer conveyor, similar to the previously described, for movement to a third rail line on which the pipe is coated, inspected, and labeled for shipment.

Line Pipe with Cement—Most of the pipe produced at Griffin is lined with 1/16 to 1/8 in. of cement mortar. The lining operation is performed by spinning the pipe on powered wheels and introducing cement by a 20-ft-long screw feeder. One end of the feeder is attached to a self-powered car which also incorporates a hopper to supply cement mortar to the feeder. The car rolls on rails to move the screw feeder in and out of the pipe during the lining operation.

At the next station the pipe rolls onto a car moved by chain drive in and out of an exhausted painting booth. On its first trip into the booth the pipe is sprayed internally with a sealing coat which retards the curing of the cement, resulting in greater strength.

When the car has withdrawn from the booth, hydraulic-cylinder-powered arms move the inside-coated pipe to a second station on the car and a succeeding length of pipe rolls to the first station. The car enters the spray booth, and as the new length of pipe is coated inside the other length is sprayed on the outside with a bituminous compound coating.

Upon emerging from the shed the pipe is given a final inspection and is weighed on a scale section of rail. When released from the scale the pipe rolls over a printing pad which applies the company trade name and is stopped at a turntable. The turntable turns every other length of pipe 90 degrees in opposite directions so that bell ends alternate for compact bundling. Bundles of pipe are fork-trucked to railroad cars or highway trucks for shipment.

Melting—Iron is melted in two hot blast, front slagging cupolas, each rated at 30 tons an hour. They are used on alternate days. Metal is tapped continuously at 2775° F into an 8-ton capacity forehearth where No. 8 grain size carbon is injected continuously 18 in. below the iron surface through a graphite lance mounted at a 45-degree angle. Carbon is fluidized in the supply tank with nitrogen at about 8 osi. The pressure is varied to control rate of carbon feed to obtain a content of about 3.80 per cent in the iron.

Carbon-treated iron is tapped to a second forehearth of 14 tons capacity where it is desulfurized with soda ash. Transfer ladles of 3000 lb capacity receive iron from the second forehearth at 2450° F for transfer by overhead hot metal carrier to the quadrant ladles at the pipe casting machines. Actually, two hot metal carriers are involved in tapping and pouring. Usually one fills transfer ladles at the forehearth and sets them on the floor. The second carrier picks up the ladles and fills the quadrant ladles. This system provides flexibility needed to control iron temperature.

Coremaking—Three styles of bell end pipe are made: Push-on joint; mechanical joint; and bell and plain end joint. Five sizes are produced in each style. Consequently 15 different cores are involved. All are made of resin-coated sand on a shell core blow machine.

Dry, 100-mesh sand is fed by bucket elevator to the gas-fired, rotary drum of a coating machine where it is heated to 275° F. Hot sand then is charged into a pug mill and 4 per cent liquid resin is added. Coated sand is discharged through screens to a bucket elevator to a 4-ton hopper over the single blow machine. The sand-coating cycle is 5 minutes.

Machined gray iron coreboxes with integral gas-fired heaters are used. They are operated between 400 and 500° F, depending on size of core being produced. The coremaking cycle also varies from 1 minute for 4 and 6-in.-diam pipe cores to 2 minutes for 12-in.-diam pipe cores. Cores are coated with a standard wash while they are hot and stacked on pallets for delivery to the pipe-making machines.

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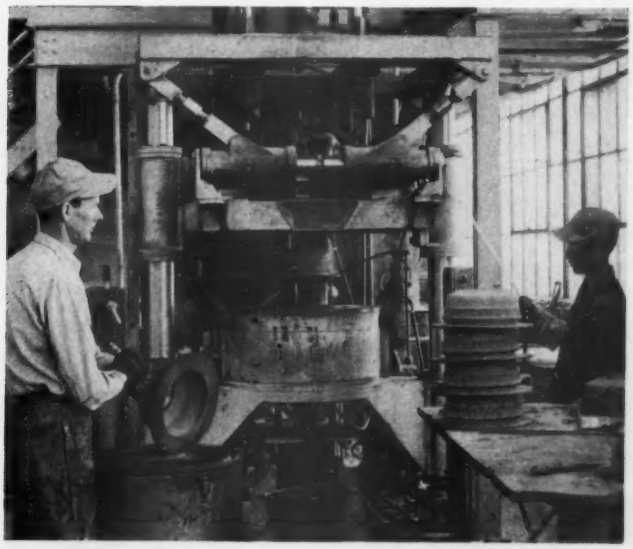
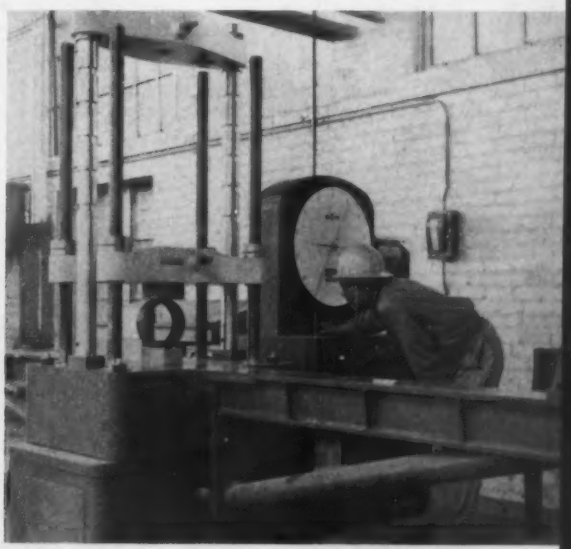
Shell cores in five sizes in each of three styles are made with coated sand in one blowing machine



A short length of pipe is subjected to crush test to obtain moduluses of rupture and elasticity



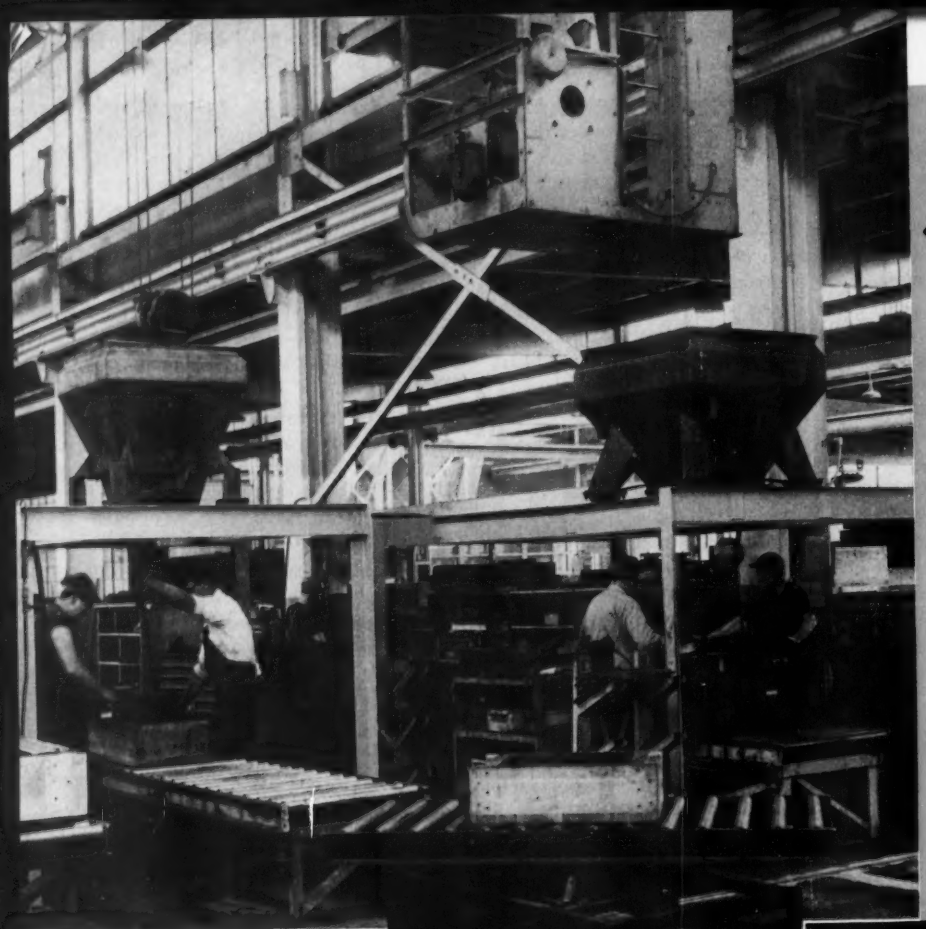


Fig. 1—A crane moves bottom-gated boxes of prepared sand from mixer to racks over the ramming stations as shown at left. Coreboxes are brought from storage on the swiveling roller table transfer car shown in the foreground

Fig. 2—Coreboxes enter the storage area from the left on conveyor in foreground. Boxes are pushed off the far end of the conveyor loop for movement to ramming stations on the transfer car

Mechanized Core Production

with Air-Setting Sand

The use of air setting sand mixes for making medium and large cores on separate conveyor lines provides advantages for this foundry

Fig. 3—Coremaker above starts vibrator of conveyor section on which the corebox rests. Vibration helps to compact the sand in the box

● PRODUCTION FACILITIES for medium and large cores at the Foundry Div., Cincinnati Milling Machine Co., were adapted to air-setting sand practice in 1957. Cores ranging in weight from 30 to 1800 lb are manufactured on a routine basis on a series of integrated roller conveyor lines in two separate corerooms. The cores are used in the manufacture of gray iron castings for machine tool components.

Many benefits were realized by the change to air-setting practice. The conventional oil sand practice formerly used in the company's foundry involved a complex mix of three base sands bonded with oil, fire clay, and cereal. These materials were proportioned to produce a core with maximum resistance to sag, metal penetration, and scabbing, but variations in cores created production problems and increased costs.

Reduced Variations—The air-setting practice, although it does not eliminate all of the variations, does reduce them substantially. The sand mix has been reduced to its simplest form—sand, oil, and chemical activators. Nevertheless, control of the sand requires tabulation of the setting characteristics of each batch with a record of the mix changes during the day.

Air-setting sand is characterized by high flowability. Because the development of dry strength is started in the box, rodding for green strength requirements has been reduced by as much as 75 per cent. Bedding of overhangs virtually has been eliminated, greatly reducing the number of cores which must be redried.

Development of dry strength before the corebox is drawn insures a core dimensionally accurate with respect to the box. This accuracy substantially reduces rubbing and fitting at assembly. The high flowability of air-setting sand results in a more uniformly rammed core, with attendant resistance to penetration. Because a portion of the dry strength is developed prior to rollover, the oven drying cycle has been reduced by 25 per cent; this reduction is equivalent to an increase in oven capacity. The high degree of collapsibility at core knockout also is an important benefit.

Two Corerooms—The two corerooms using the air-setting process differ in several respects, the differences being, however, simply functions of the average size of core produced. A description of the large core production facilities therefore will serve to explain the process as it is used at Cincinnati.

Sand Practice — The basic sand mix is as follows:

1. Sand—1 part lake sand, 3 parts reclaimed sand.

2. Oil—2¼ per cent (sand-weight basis) air-setting oil.

3. Activators—3 per cent (oil-weight basis) sodium carbonate peroxide, 1 per cent (oil-weight basis) organic metal salt.

An 1800-lb batch has been found

to be the optimum size for this general class of core work. Dry sand at 0.25 per cent maximum permissible moisture is delivered, preweighed, to the mixing station in the coreroom. Determinations of fines are made four times daily by the laboratory and are controlled to less than 9 per cent. Adjustment in the classifying section of the sand reclamation system aids in control.

The position of the mixing station in the coreroom is necessary to minimize the over-all interval for mixing and coremaking before the sand becomes unusable. Thus the mixer operator can co-ordinate the start of the five-minute mixing cycle with the rate of use.

A working time of 35 minutes has been found desirable in practice. This time can be maintained by varying the amounts of the two accelerators when conditions such as relative humidity, sand temperature, or percentage of fines change.

Core Production—Prepared sand is discharged from the mixer into bottom-gated sand boxes which are moved by crane to racks over the two ramming stations. Suitably interconnected roller conveyors are used to transport boxes through the department, including delivery to and from storage (Fig. 1 and 2).

The ramming station conveyor section is spring mounted, and pneumatic vibrators attached to the conveyor are used to help compact sand as it is dropped into the corebox. Lifting hooks and the few reinforcing rods required are set in place after the first layer of sand has been dropped.

Where necessary, hand tucking is done, and the box is overfilled to a slight degree. The pneumatic vibrators are turned on during this phase of the ramming operation (Fig. 3). The box then is pushed down the conveyor, and excess sand is struck off.

The period required for setting up of the binders is a function of the depth of the box, and the average core takes about 90 minutes.

The core rollover is situated with its axis 90 degrees to the conveyor line on which the boxes are stored during the setup interval. The overhead crane which services the sand mixer is used to move boxes from the conveyor line to the feed-in conveyor of the rollover.

After rollover, the core is conveyed on a transfer car to finishing conveyors (Fig. 4), the same car being used to return the boxes to the ramming station. If additional cores are required, the box enters the ramming station. If not, it is moved through to the conveyor section which leads to the box storage area.

Fig. 5 illustrates the simplified mixing and ramming methods employed to produce medium-sized cores. Batches are made with a 10-minute working time and weigh 250 lb. They are prepared in a wheelbarrow-type muller adjacent to the ramming area. Holding the setting time to 30 minutes permits an adequate turnover of boxes necessary for this class of work.

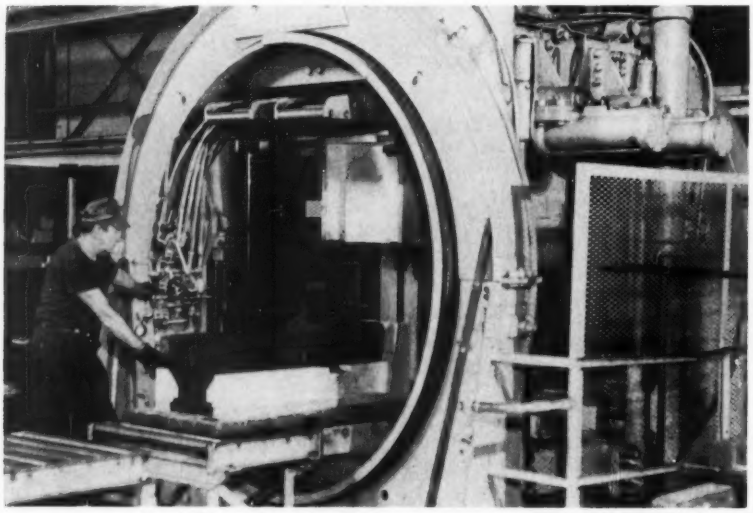


Fig. 4—Air-hardened cores are drawn from the boxes in rollover machines and rolled from the machine to a car for transfer to finishing conveyors

Fig. 5—Smaller size cores are produced on the conveyor setup as shown here. Sand is prepared in a wheelbarrow muller and scooped in the boxes

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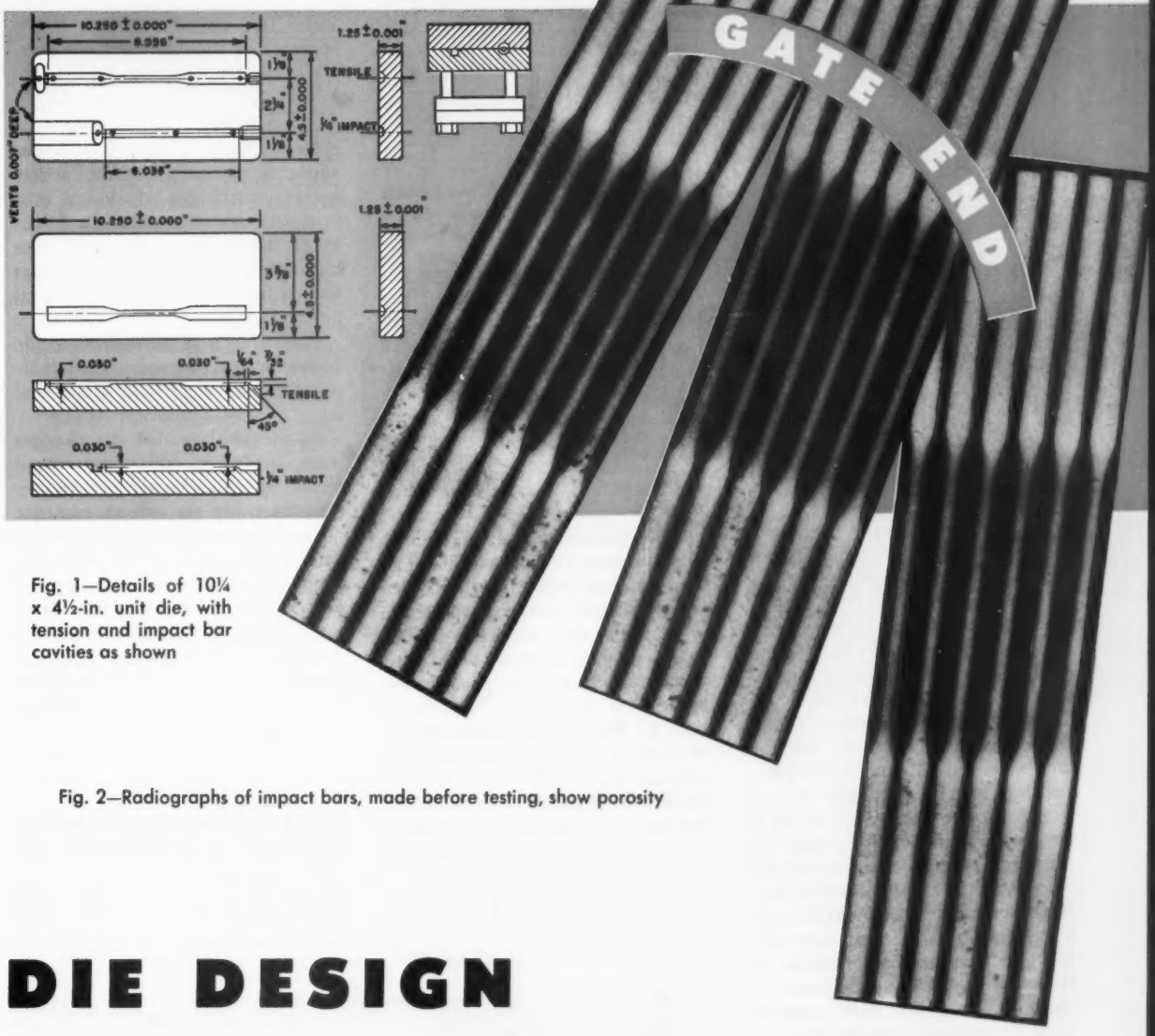

Fig. 1—Details of 10¼ x 4½-in. unit die, with tension and impact bar cavities as shown

Fig. 2—Radiographs of impact bars, made before testing, show porosity

DIE DESIGN

Improves Zinc Diecastings

Impact strength of zinc diecastings is discussed in relationship to features of die designs planned to produce optimum quality. This article includes a resume of composition limits in zinc diecastings

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● IN ANY STUDY involving properties of zinc diecastings, it is desirable to conduct experimental work with a die that produces standard test bars. This approach permits savings by avoiding the machining of test bars and eliminates the difficulty of selecting a commercial casting from which standard-sized bars can be machined. The latter practice is extremely difficult because the tensile bar is ⅜ in. in diam at the grip ends and 9 in. long, and the impact bar is ¼ in. square and 6 in. long.

Another serious problem with machined bars is that they may not represent the true strength of the diecasting since the chilled outside layer, generally called the skin, is responsible for most of the impact strength. The skin is removed completely in the machining of tension bars, but generally can be saved on one side of the impact bars. One side will suffice if the bars are tested with the skin-side in tension.

Considering all these advantages, with, of course, confirmation of the final results in commercial practice,

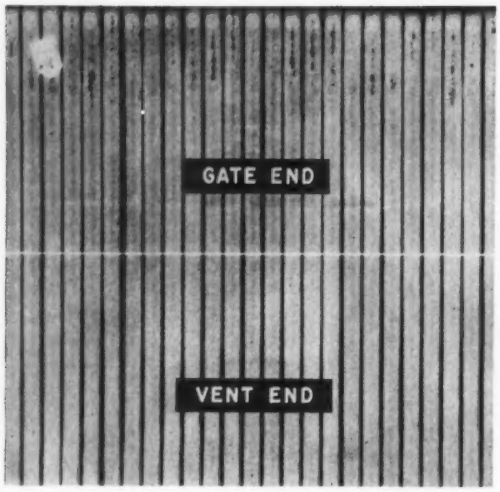


Fig. 3 — Considerable porosity shows up in radiographs of impact bars not designed for optimum quality

the selection of a test bar die for a study of die design is obvious.

In die design we include runners, gates, overflow wells, vents, and all other die features except the casting cavities. In this paper the subject is condensed to cover, primarily, only gates and overflow wells.

Experimental Procedure—Fig. 1 shows the 10¼ in. x 4½ in. unit die, with tension and impact bar cavities, which was used in this work. At the beginning, depth of the gates was 0.030 in., and the runners to the overflow wells also were 0.030 in. Each overflow well had a capacity of about 0.07 cubic in. When this die first was used, however, the test bars were so inferior that a statistical analysis showed 40 impact bars were required to obtain a result that was within ±10 per cent of the true average of the castings in 95 out of 100 cases. Radiographs showed that the test bars also contained considerable porosity.

Thus, two die changes were made before the die design study was started: 1. Four vents were added to the die at regularly spaced distances along the side of the impact cavity. 2. A waster bar in the shape of a 5/16-in.-square impact bar, with an accompanying large overflow well, was added between the tension and the ¼-in.-square impact cavities. This waster bar was added to facilitate getting the die up to the proper temperature and to assist in holding the temperature at a more nearly constant value.

Objective of this work was to make repeated, small changes to the gates and overflow wells until optimum properties and conditions had been reached and finally exceeded and then, with this knowledge, to re-establish the conditions which would produce castings with these properties: 1. Freedom from porosity in the test sections. 2. Possession of the same high impact strength for both the gate and vent ends of the bars 6 in. long. 3. Uniformity in strength such that any five bars taken at random would be within ±10 per cent of the true average in 95 out of 100 cases.

Test bars made at the start of the program, under closely controlled conditions of metal and die temperatures, air pressure, and speed of operation of the diecasting machine, exhibited the properties for Zamak-3 (old ASTM XXIII, new ASTM AG 40A) shown in Table I.

Nonuniform Strength — These data clearly show the nonuniformity in impact strength which can exist in diecastings of as simple a design as an impact bar if the die design is adequate only to produce castings and is not designed for optimum quality.

Radiographs of these bars, made before testing, showed considerable porosity as evidenced in Fig. 2 and 3.

As previously stated, die changes were made in individual, small steps. In this manner it was possible to study the effects each die change produced, and it therefore was possible to recognize when optimum conditions for each type of change had been reached. It is known that if the gate depth, for instance, is at its maximum size, a change in the size of the overflow may disturb the optimum condition established for the gate.

TABLE I—Mechanical Properties of Zamak-3 at Beginning of Test

Pressure on metal—1500 psi Metal temperature—780°F Die temperature	300°F	390°F	480°F
Tensile strength, psi	44,000	43,400	43,000
Impact strength, ft lb—gate end	35	35	38
Impact strength, ft lb—vent end	7	10	18

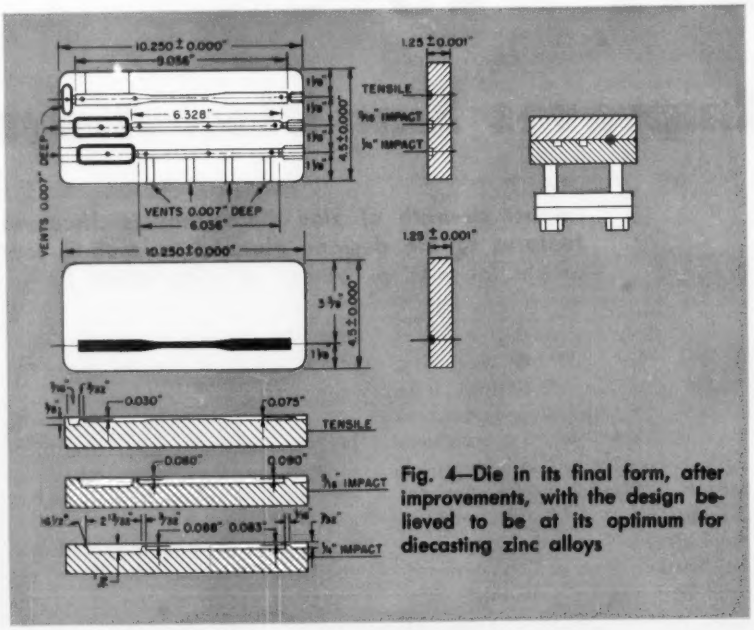


Fig. 4—Die in its final form, after improvements, with the design believed to be at its optimum for diecasting zinc alloys

Fig. 4 shows the die in its final form, with the design believed to be at its optimum for the diecasting of zinc alloys. The major changes consisted of the following: *¼ in. impact bar cavity*: 1. Gate depth was increased from 0.030 to 0.083 in. 2. Overflow well runner depth was increased from 0.030 to 0.088 in. 3. Overflow well was increased from 0.07 to 0.6 cu in. *¼ in. round tension bar cavity*: 1. Gate depth was increased from 0.030 to 0.075 in. 2. Overflow well was increased from 0.06 to 0.15 cu in. Actually, the vent grip end of a tension bar is in effect an overflow well so far as the test section is concerned. On this basis the overflow well capacity for the tension bar actually is about 0.45 cu in.

With the die in this condition, the mechanical properties for Zamak-3 for the same three die temperatures were as shown in Table II.

TABLE II—Mechanical Properties of Zamak-3 at End of Test

Pressure on metal—1500 psi
Metal temperature—780°F

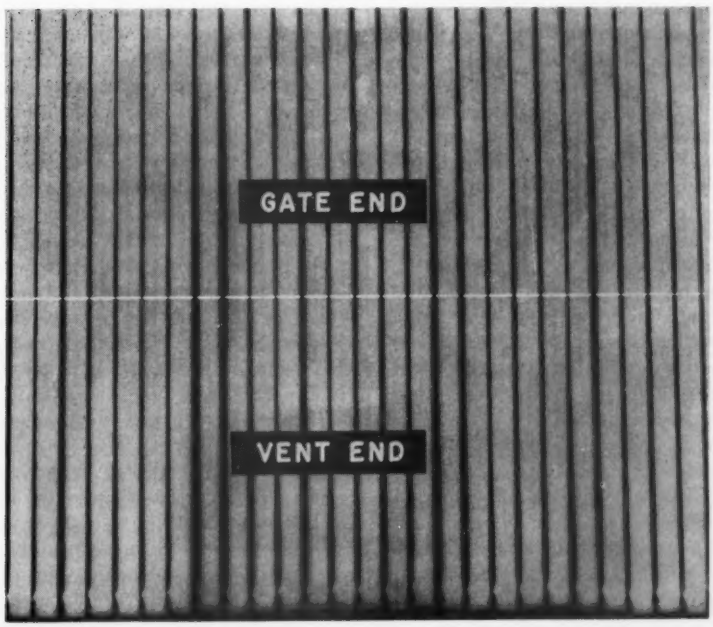
Die temperature	300°F	390°F	480°F
Tensile strength, psi	44,000	40,800	40,100
Impact strength, ft lb—gate end	38	42	38
Impact strength, ft lb—vent end	36	44	43

The improvement in impact strength resulting from the die changes is readily apparent. Note that the strength of the gate end of the impact bars was not greatly affected by the die changes. The greatest improvement was in the impact strength of the vent end of the bars. In the improved die, in many instances impact strength of the vent end of the bars exceeded that of the gate ends slightly, but not significantly. This difference could indicate that the gate is a few thousandths too deep because the drop in gate end impact strength is the criterion for the endpoint in gate depth design.

Study of the impact values with regard to the original objectives shows that the first point has been met—namely, that the impact bars should possess the same strength for both gate and vent ends.

Fig. 5 shows the impact bars to be virtually free of porosity. Fig. 6 shows the same for the round tension bars, except for some slight porosity in the vent grip ends. The test areas were sound. The porosity of the tension bars could have been eliminated if there had been room in the insert die to increase the overflow well. Thus, the second objective—that the bars should be virtually free of porosity—also was accomplished.

Fig. 5—Impact bars produced after die design changes were made show improved impact strength of the vent end of the bars



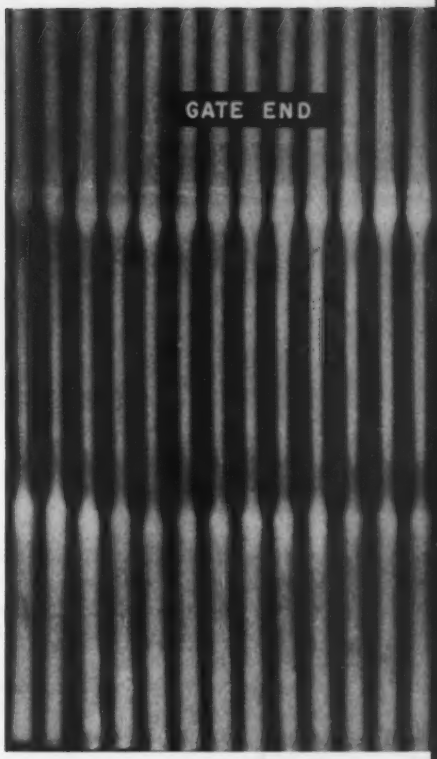


Fig. 6—Tension bars made with design changes show some slight porosity in the vent grip ends

To study the uniformity of the specimens, 100 impact bars of Zamak-3 cast under controlled conditions were tested for their impact strength at both gate and vent ends, making a total of 200 tests. Results are shown in Table III.

Statistical analysis of these results showed that a sample size of three to five bars was sufficient to yield an average impact value within ±10 per cent of the true average in 95 out of 100 cases, thus satisfying the third and last objective of the die design test.

Since completion of this die design work occurred prior to the most recent ASTM atmospheric exposure test on zinc diecasting alloys, the

TABLE III—Impact Strength Tests

Impact Strength, Ft lb	No. of Results
33-35	2
37-39	4
39-41	7
41-43	11
43-45	20
45-47	153
47-49	2
49-51	1
Total	200

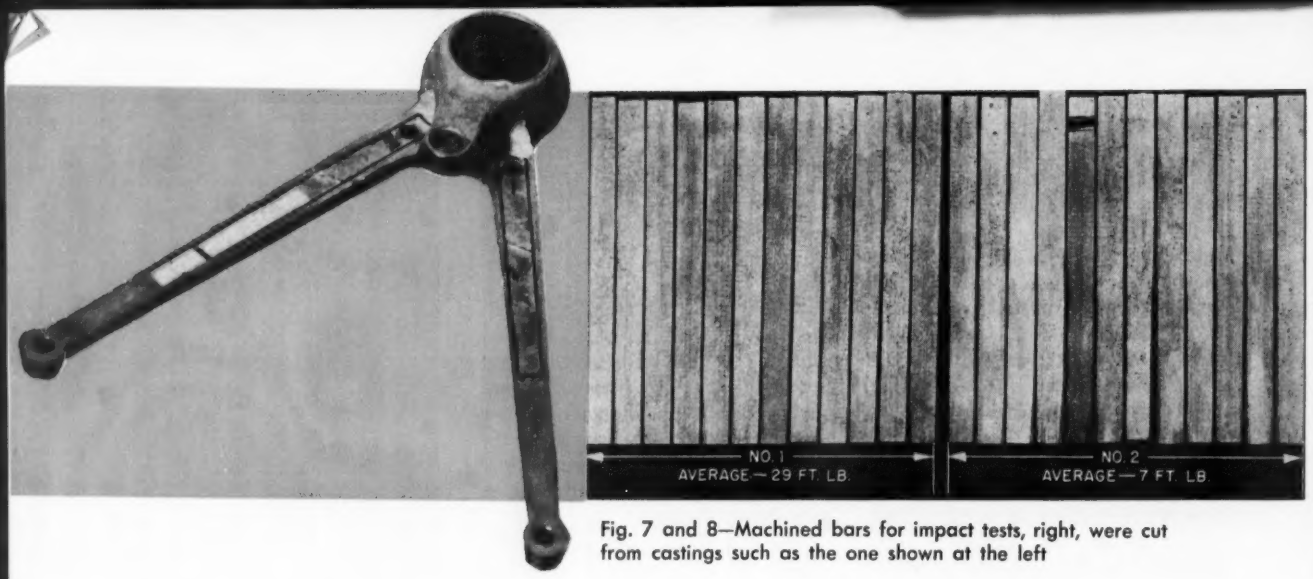


Fig. 7 and 8—Machined bars for impact tests, right, were cut from castings such as the one shown at the left

Committee on Die Cast Metals and Alloys set up the requirement that this latest die design had to be incorporated in the test bar dies of the co-operating laboratories.

Four companies which produced test bars of Zamak-3 for this ASTM program had the following average gate and vent impact strengths as determined by three testing laboratories on the specimens they submitted for exposure from their own dies: 1. Gate end, 39 ft lb; vent end, 41 ft lb. 2. Gate end, 40 ft lb; vent end, 41 ft lb. 3. Gate end, 36 ft lb; vent end, 40 ft lb. 4. Gate end, 42 ft lb; vent end, 44 ft lb.

These results verified that the design principles could be translated to other test bar dies with equal satisfaction.

Commercial Castings—Next came the desire to know the impact strength of commercial diecastings and how efficiently these features of die design could be applied to diecastings.

A check of the industry, made by testing 148 $\frac{1}{4}$-in.-square bars cut from 77 commercial zinc diecastings, showed an average impact strength of only 18$\frac{3}{4}$ ft lb. Since the cast test bars, described earlier, showed that the zinc alloys were capable of possessing about 40 ft lb of impact strength, efforts were directed toward helping diecasters apply these design features in their own plants.

Diecasters and users of diecastings are not interested primarily in impact strength. Of far greater importance to them is improved soundness and surface finish, both of which result simultaneously with high impact strength when the improved die design is used. In fact, most of the increase in impact strength at the vent end of the castings in improved dies is the direct result of improved surface finish.

Without the use of thick gates and large overflow wells it is almost impossible to produce castings free from cold shut imperfections. Such blemishes concentrate the stresses and act as notches in impact loading. To demonstrate the effect of a notch on loss of impact strength, it is necessary only to draw a file across an impact bar until a groove is perceptible to the touch. When such a bar is tested, with the notched side in tension, the impact strength of a 45-ft-lb bar is decreased to less than 5 ft lb.

Application of these die design principles to the industry has been a slow process because most production dies are hardened and therefore cannot be altered except at considerable expense. In addition, in almost all instances, production requirements exceed capacity, and the dies can not be spared for experimental work. Consequently, the only active commercial dies available for our tests were those in which diecasters were unable to produce satisfactory castings or in which rejection rates were abnormally high.

In a way, this arrangement was satisfactory in that the design features were put to extremely gruelling tests. On the other hand, it proved to be a handicap in that it never was possible to apply the design features to an entire plant. Hence they were being used only as a last resort by the diecasters who were familiar with them.

Higher Cost—A certain element of cost is connected with the use of the optimum design features, particularly in the use of thick gates. Such gates present trimming problems and increase trimming costs. Consequently, a gradual program is suggested to allow time for the development of trimming methods to cope with the thicker gates.

On the other hand, the use of large overflow wells does not present any hardships nor extra expense. In fact, it has been shown that the remelting load is less than that of rejected castings in which no overflow wells are used.

The following typical case histories show the variations found in commercial diecastings while these die design features were being introduced. The number of cases is small relative to the number of dies which were improved, but we must remember that the diecastings involved had to have wall thicknesses of $\frac{1}{4}$ in.

Fig. 7 shows a casting with two similar projections, from each of which it was possible to cut one impact bar. Since 12 of these castings were available, 12 bars were cut from both the No. 1 and No. 2 positions. These machined bars are shown in Fig. 8.

Impact tests revealed that the No. 1 bars had an average strength of 29 ft lb, whereas the No. 2 bars averaged only 7 ft lb. Since the projection from which the No. 1 bars were cut was cast with an over-

Fig. 9—Eight impact bars were cut from this casting for testing

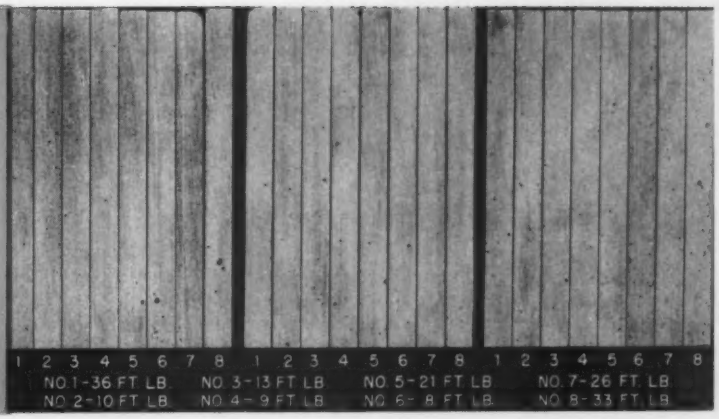


Fig. 10—Impact values of test bars cut from castings such as that shown in Fig. 9

flow well, whereas the other projection had none, these figures are real evidence of the value of the overflow well.

Fig. 9 shows one of three castings from each of which eight impact bars were cut. The gate was between the No. 1 and No. 8 bars, and these bars consequently would be expected to have the highest impact strength. Fig. 10 shows the impact values, and the No. 1 and No. 8 bars had the highest results. The No. 6 bar was cut from the vent end. It had the lowest impact strength since these castings did not have overflow wells.

Fig. 11 contains two views of the same casting to illustrate the two locations at which bars were cut from this handle. Twelve such castings were available for testing. Fig. 12 shows the average strength of the No. 1 bars was 15 ft lb whereas that of the No. 2 bars was 9 ft lb. Careful examination of the castings showed that some of the diecast skin had been removed when the gate was trimmed from the casting. This loss was believed responsible for the difference in the strength of the two sets of bars.

Changing the gate to the heavy part and adding an overflow well to the tip of the casting verified this premise. After this change had been made, the No. 1 bars averaged 37 ft lb and the No. 2 bars 38 ft lb. Thus, not only was the inequality of strength wiped out, but the improved design also was exceedingly beneficial to the strength. In addition, note the porosity of the machined impact bars.

The bars in Fig. 13 were cut from the handle castings after the die had been altered. The improved die design obviously was as beneficial to the soundness of the castings as it was to the impact strength.

These examples show that the benefits of die design are real and desirable and that they can be evaluated on test bars and completely transferred to commercial castings.

Intelligent use of these features will assist in the production of zinc diecastings with high strength, great soundness, and superior surface finish.

Aluminum and Magnesium—Although the die design principles described were discussed only in relation to zinc diecastings, they also apply to aluminum and magnesium diecastings. However, with the greater metal pressures applied in cold chamber machines and the better thermal conductivity of aluminum and magnesium alloys, the extent and the nature of the die design are not so critical as in zinc diecasting.

COMPOSITION LIMITS

All of the design principles are of no value, however, unless the alloys are on grade in composition, and zinc alloys again are the most critical. Unfortunately, zinc diecastings, with and without die design features, can be produced from off-grade alloys without diecasting difficulties and without visual detection. Therefore, no paper on quality zinc diecastings is complete without stress on the need to maintain established composition limits (see ASTM B 86-57 T).

A resume of the reasons for the limits for each element in zinc diecastings (not ingot) follows.

Aluminum—All mechanical properties are affected seriously by excessive amounts of aluminum, with impact strength showing the most marked change. Loss of impact strength begins at 4.5 per cent, and at 5.0 per cent the casting is brittle. To be certain that diecastings are not produced with originally impaired strength, it is particularly important that the maximum alu-

Fig. 11—Two views of the same casting to illustrate the two locations at which bars were cut from the handle for impact strength tests

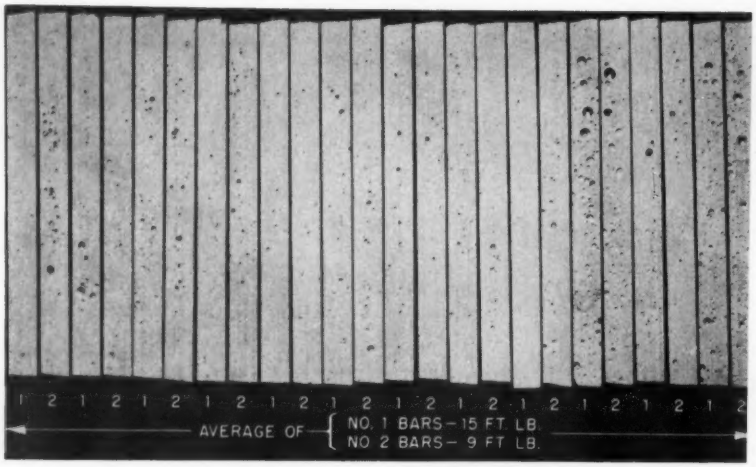


Fig. 12—Average strength of No. 1 bars taken from handle castings was 15 ft lb, whereas average strength of No. 2 bars was 9 ft lb

minum content be set close to—but under—4.5 per cent. Since chemical aluminum analyses may regularly be 0.15 per cent below the true aluminum content, and since this method is required by ASTM in case of dispute, the positive and real limit is 4.3 per cent.

There is no such real limit for the minimum aluminum content, although several factors make it desirable not to stray too far below 4 per cent. Aluminum contents under 3.5 per cent promote hot shortness, hinder production of good surface finish, and lower mechanical properties. The loss of properties occurs at a rate which reduces strength and stability to 50 per cent of optimum when the aluminum content is lowered to 2.0 per cent. Further reductions in aluminum bring about a continued rapid loss of properties.

Arbitrarily, the minimum aluminum content has been set at 3.5 per cent. The spread between 3.5 and 4.3 per cent allows sufficient latitude for production without sacrificing too much from the optimum properties.

Copper—No copper is added to Zamak-3 intentionally but some copper contamination usually occurs in the alloying and diecasting operations. It never should come close to the 0.25 per cent which is allowed by specification unless there is a poor choice of raw materials or the alloying and diecasting are done carelessly.

In Zamak-5, the copper limits are 0.75 to 1.25 per cent. The maximum limit, although not absolute, cannot be exceeded appreciably without producing dimensional instability and rapid loss of impact strength on normal aging. This loss occurs at a more accelerated rate if the casting is subjected to higher but still permissible temperatures. The minimum limit has been set arbitrarily at 0.75 per cent so as to differentiate this alloy from Zamak-3 by specification.

Actually, the copper content can safely range from 0 to 1.25 per cent in all instances where Zamak-3 and Zamak-5 can be used interchangeably. In the few instances where one of these alloys is required rather than the other, the actual dividing line occurs at 0.40 per cent. In other words, the characteristics of Zamak-3 will be retained with copper contents up to 0.40 per cent; from 0.40 to 1.25 per cent, zinc diecastings will have the properties of Zamak-5.

ASTM, after a recent careful study of the copper limits in the two zinc diecasting alloys, now has a footnote in its specification (B 86-57T) which states that for the majority of commercial applications, a copper content in the range of 0.25 to 0.75 per cent (which is not now permitted by the two alloys) will not affect the serviceabiltiy of diecastings adversely and should not serve as a basis for rejection. Although this statement is true, the production of diecastings in this unspecified copper range indicates careless control.

Magnesium—The successful solution to the development of stable, high-strength zinc diecasting alloys included two points: 1. The discovery that magnesium could counteract the harmful corrosion caused by small quantities of impurities such

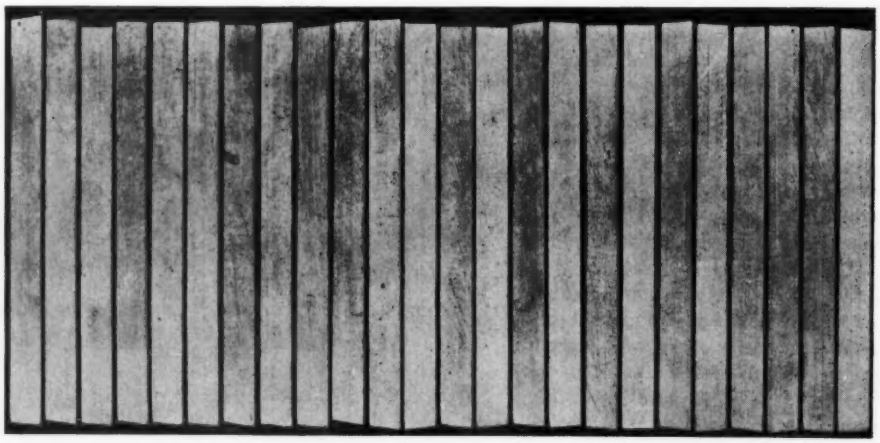


Fig. 13—These impact bars were cut from the handle castings after die design alteration

as, lead, tin, and cadmium. 2. The production of special high-grade zinc in which the impurities are so low that they can be neutralized with magnesium. Thus the minimum magnesium limit is the amount which will prevent the formation of subsurface corrosion. This limit was established on the basis of accelerated tests, later confirmed by long-time aging tests, at 0.03 per cent.

The magnified ½ x ⅛-in. cross sections of flat tension bars in Fig. 14 show clearly the beneficial protective effect of 0.03 per cent magnesium. The diecasting on the left, without magnesium, is about two-thirds corroded, as evidenced by the dark area around the specimen. Only the bright, unoxidized region retains any appreciable strength. The diecasting on the right, with the magnesium addition, shows complete absence of the subsurface corrosion.

The maximum value for magnesium was set arbitrarily at 0.08 per cent. There is little chance, however, that this value will be approached closely by diecasters since the alloys become quite hot short above 0.05 per cent and are not castable into anything but simple shapes. High magnesium contents also reduce room temperature impact strength and ductility. In view of the detrimental effects of high magnesium contents, it is customary to prepare the alloys with the minimum amount (0.03 per cent), although 0.04 per cent is the optimum percentage.

A discussion of the limits of magnesium cannot be considered complete without a warning that fluxes remove magnesium, and the loss depends on the amount of flux used. The maximum safe amount that can be used is about 3 lb of flux per ton of alloy, and 30 lb per ton is likely to remove all of the magnesium. When a flux is used, the alloy always must be analyzed and magnesium added to compensate.

Lead — With magnesium limits that permit sufficient castability to produce complex designs, the maximum lead content that can be tolerated without making the alloys susceptible to subsurface corrosion is 0.007 per cent. This limit was established on the basis of accelerated aging tests which consistently showed subsurface corrosion of diecastings with 0.009 per cent lead and none in alloys with 0.007 per cent.

Confirmation of the results from the accelerated tests can be obtained from the two 18-year old Zamak-3 diecastings shown in Fig. 15. The flat tension bar on the left contains 0.007 per cent lead and is free from subsurface corrosion. The casting on the right contains 0.009 per cent lead and is completely enveloped by a corrosion layer.

Cadmium — At high concentrations (0.1 per cent and up), cadmium is detrimental to the mechanical properties of zinc diecasting alloys. All concentrations affect castability adversely, but the amount in special high-grade zinc is too low to produce a noticeable effect. For this reason the cadmium specification has been set at 0.005 per cent, which is high enough to include all makes of special high grade zinc, yet low enough to exclude contamination from other sources.

Iron—Iron has no detrimental effects on the permanence or properties of zinc diecastings, but an excess of iron may affect machinability. About 0.02 per cent can remain in liquid solution at zinc diecasting temperature. Greater amounts form hard compounds with the aluminum. These are lighter than the alloy and float on the surface of the melt, from which they can be removed easily. With good diecasting practice zinc diecastings themselves should not contain much over 0.02 per cent iron, but with careless operation some excess iron may be entrapped in the alloy. To keep the hard spots caused by iron-aluminum compounds at a minimum, the iron limit in a diecasting has been set arbitrarily at 0.1 per cent.

Tin—Tin is not a natural impurity in zinc or any of the diecasting alloy ingredients. But unless great care is exercised in the alloying or diecasting operations to avoid inclusion of tinfoil, solder, or tin-plated inserts, tin will be present in the diecastings. Since tin is several times more powerful than any of the other usual contaminants in the promotion of subsurface corrosion, it is easy to understand the reason for the low maximum specification value of 0.005 per cent.

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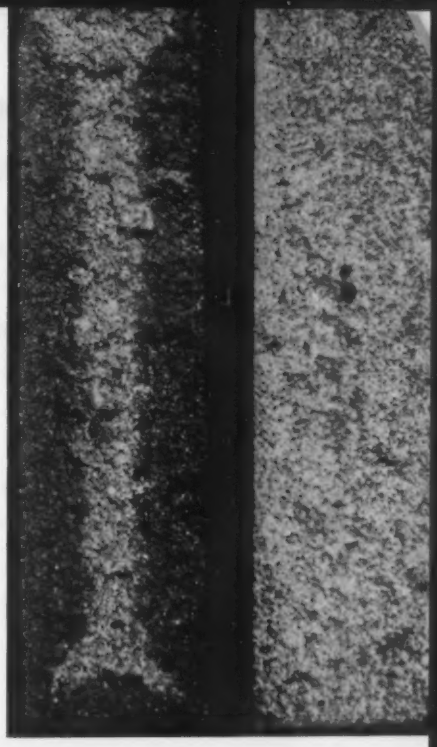
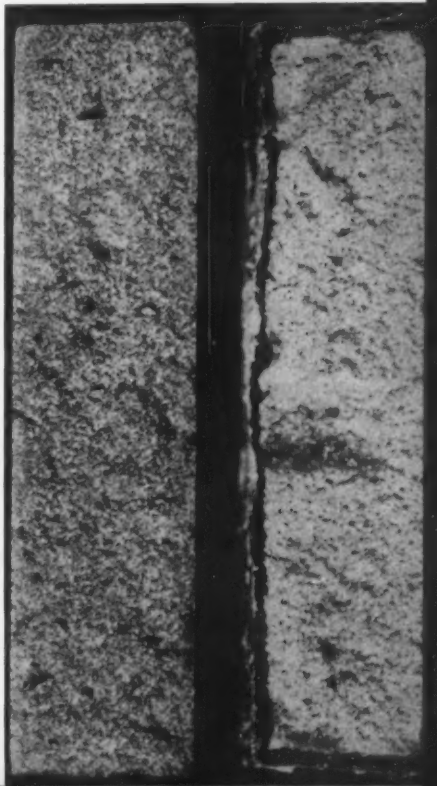


Fig. 14—Magnified ½ x ⅛-in. cross sections of flat tension bars show beneficial protective effect of 0.03 per cent Mg

Fig. 15 — 18-year-old Zamak-3 diecastings. Flat tension bar, left, contains 0.007 per cent lead. The casting on the right contains 0.009 per cent lead



INOCULANTS

for Production of

HIGH-STRENGTH GRAY IRON

Here's a concise treatment of the important subject of inoculation, including information on its purposes, types of inoculants available, and how to use the technique successfully in your foundry

By HOWARD H. WILDER
Vanadium Corp. of America
Chicago

● INOCULATION of iron is its conversion by the addition of relatively small amounts of suitable agents to obtain graphitization and thus produce gray cast iron from iron that would otherwise solidify white. These high-strength gray cast irons are used in the automotive, railroad, aircraft, power generating, mining, and other related fields which require materials that will perform for an indefinite period of time.

The practice of inoculation on an industrial scale goes back to 1924, when Augustus Meehan patented his process. A similar method was recommended at about the same time by Stock and Blackburn, but no patent resulted. The first additive agent used in inoculation was calcium silicon. Later, graphite, aluminum, and alkali metals were employed with moderate success. In 1940, Henry Chandler pointed the way to more complex inoculants with the development of a chrome-manganese-silicon addition agent, the so-called stabilizing type of inoculant.

Graphitization in cast iron also is produced by silicon, calcium, titanium, zirconium, manganese, aluminum, lithium, and other elements. The precise manner in which graphitization occurs still is debatable.

In American foundries, large quantities of standardized products often must be produced from highly variable raw material by relatively unskilled labor supervised by very few technically trained foundrymen. This imposes considerable difficulties on the production process. Irons of a consistent chill and products of acceptable quality are obtainable only by using inoculants to make up for differences in the hot metal.

Many Varieties—A great variety of inoculants are available. (Table I lists the standard American inoculants.) In some instances, inoculation is combined with alloy additions when it is desired to introduce an alloying agent such as chromium or vanadium into the iron simultaneously with inoculation. The alloying agents will be discussed later.

The American Society of Testing Materials has established a series of tensile specifications for standard gray iron castings. These are in the form of numbers such as class 30, 35, and 40. Each of these numbers represents 30,000, 35,000, and 40,000 psi as taken from a standard size arbitration bar.

Thus, for example, one typical American firm is called on to produce ASTM class 30, 35, and 45 irons on a daily basis, using a 1.2-in. arbitration bar as a representation of the section size of the castings being poured. The amount produced is 35 tons of class 30 for castings utilized by the automotive, agricultural, and electrical industries; 15 tons of class 35 for machine tools, valves, and automotive brake drums; and 10 tons of the class 45 tensile material for more highly stressed pressure-containing parts used in hydraulic equipment and in applications which have severe wear resistance requirements.

The three base irons used by this typical firm have carbon equivalent values of 4.3, 4.0, and 3.7, respectively. If these irons were not inoculated, they would show tensile values of 29,000, 35,000, and 41,000 psi. This foundry and others faced with similar specification demands use three basic metal charge mixtures. They are comprised of 10 to 30 per cent malleable grade pig iron, 10 to 45 per cent steel scrap, 30 to 40 per cent home cast scrap, and the balance purchased cast iron scrap.

In addition, it is necessary to add silicon in some form to adjust the metal charge for loss of this element in melting and to make up the deficiency caused by steel scrap. This addition usually consists of silicon briquets, 16 per cent silicon silvery pig, or 50 per cent lump ferrosilicon.

It has been found that a chemical composition such as outlined in Table II will produce the necessary physical properties in the various

TABLE I—Composition of American Inoculants

Inoculant	Silicon	Calcium	Aluminum	
50% Ferrosilicon	47-51%	0.20%	1.00%	
65% Ferrosilicon	65-69%	0.30%	1-2%	
75% Ferrosilicon	74-79%	0.50%	1-2%	
85% Ferrosilicon	80-89%	0.50%	1-2%	
95% Ferrosilicon	90-95%	0.50%	1-2%	
Silicon calcium 50	50-55%	6-8%	1-2%	
Silicon calcium 85	80-90%	0.50%	1-2%	
Calcium silicon	60-65%	30-33%	1.00%	
Calcium-silicon-titanium	50-55%	5-7%	1.25%	10% Ti
Silicon-manganese-zirconium	60-65%	2.0%	1.70%	6% Mn 6% Zr
Chromium-manganese-silicon	17-19%	1.0%	0.20%	40% Cr 10% Mn
Ferrochrome-silicon	25-30%	.....	.....	50% Cr
Nickel-silicon	30%	.....	.....	60% Ni

classes of iron which are needed.

The mechanical properties of each of these irons are improved by treatment with 2 to 4 lb of 75 per cent ferrosilicon per ton. The degree of property change depends on the interaction of silicon and carbon, the contingent effect on the inherent structure of the base iron, and the temperature at which the iron is treated. Tensile values of the inoculated irons are 32,000, 38,000, and 49,000 psi minimum, respectively. Also improved are transverse strength, deflection, Brinell hardness, and chill elimination in critical sections in which maximum machinability is desired.

Another Example — Another American firm, whose basic product is 85 tons of class 30 irons, also is required to cast 15 tons of its daily production as class 40 iron. Both irons, however, are made simultaneously on the same production line. This firm resorts to inoculation plus alloys to attain the necessary tensile values because it has been found to be more economical to use alloys than to change operating practices.

The base iron contains 3.4 per cent carbon and 2.10 per cent silicon, and the addition of 2 to 3 lb of a silicon-base agent produces an average tensile strength of 35,000 psi. Further addition of 0.75 per cent nickel, 0.35 per cent molybdenum, and 0.30 per cent chromium leads to a tensile average of 45,000 psi.

The two irons cited are typical examples of increases in tensile strength resulting from the use of inoculants in one instance and inoculants plus alloys in the other. These irons ordinarily would have low mechanical properties, but with inoculation, consistently high-strength products are obtained.

Adjusting Chill Depth — Many consumers of castings are more interested in lack of chill in critical machine areas than in strength of microstructure. Usually, high chill depths in American practice are caused by rapid cooling rates, lack of inoculation, presence of carbide stabilizing elements (such as chromium, boron, vanadium, and tellurium), temperatures almost high enough to cause oxidation, and low silicon in the metal charge.

To promote low chill depths, it is necessary to have good inoculation practice, controlled melting conditions and temperatures, and slow cooling rates. The effect of inoculation is to level off irregularities in foundry practice, thus insuring uniformity in chill control.

Factors governing the effective use of graphitizing or stabilizing inoculants are as follows: 1. Carbon equivalent range 3.4 to 4.4. 2. Amounts of steel in melting charge. 3. Control exercised in melting base iron. 4. Temperature at which inoculation is made. 5. Temperature at which molten iron is poured. 6. Time elapsed from inoculation to pouring.

The use of one base iron and graphitizing and stabilizing types of inoculants has enabled many foundries to cover a wide range of casting section sizes. In American practice, a number of foundries are called on to obtain machinability in thin sections and good density and wear resistance in thick sections of a single casting that may vary in thickness from 1/4 to 3 in. Only by using inoculants and exercising chill control can this be accomplished.

There is a constant struggle among foundrymen, fabricators, extruders, drop forgers, and assemblers to capture the mass market in America. This market puts a premium on efficient, low-cost production. The American gray iron foundryman uses inoculants as an effective weapon in this competitive endeavor.

Amounts of inoculants for addition purposes differ from plant to plant. The usual additions of graphitizing-type inoculants vary from 0.10 to 0.50 per cent silicon. For chill control in carbon equivalent irons of 4.0 to 4.4 per cent, the smaller quantity is satisfactory. Less than 0.10 per cent silicon usually is not enough to remove or alter any objectionable structures. More than 0.50 per cent silicon usually is unnecessary unless an extremely high chill test is encountered because of chemical changes in melting practice.

In the use of stabilizing-type inoculants, amounts of alloy are from 0.50 to 1.00 per cent. The quantities of alloy needed depend on physical properties and the final Brinell hardness desired.

Fig. 1 shows the carbon equivalent and tensile strength relationship of base irons and irons treated with both types of alloys. This relationship has been established for a number of years by many large-volume manufacturers of castings and is used throughout America.

Addition sizes of inoculating agents are important and vary depending on the magnitude of the ladle treated, temperature, time of holding, and type of inoculant. American alloy manufacturers generally supply eight sizes of graphitizing-type agent (ranging from 1/2

TABLE II—Composition of Various Classes of Iron

	Class 30	Class 35	Class 40
Total carbon	3.45-3.55%	3.15-3.25%	2.95-3.05%
Silicon	2.10-2.25%	1.95-2.10%	1.80-1.95%
Manganese	0.60-0.70%	0.60-0.70%	0.60-0.70%
Sulfur	0.12% max	0.12% max	0.12% max
Phosphorus	0.12% max	0.12% max	0.12% max

TABLE III—Alloying Elements in Gray Cast Iron

Element	Addition Per Cent	Chill Depth	Graphite Structure	Effect On Matrix Structure	Effect On Matrix Hardness
Aluminum	0.01-1.25%	Decreases	Coarsens	Produces ferrite	Softens
Boron	0.01-0.25%	Increases	Refines	Produces carbides	Hardens
Carbon	0.01-0.25%	Decreases	Refines	Produces ferrite	Softens
Chromium	0.10-2.00%	Increases	Refines	Produces carbides	Hardens
Copper	0.25-2.00%	Decreases	Refines	Produces pearlite	Hardens
Manganese	0.25-1.00%	Increases	Refines	Produces carbides	Hardens
Molybdenum	0.20-1.00%	Increases	Refines	Produces pearlite	Hardens
Nickel	0.10-3.00%	Decreases	Refines	Produces pearlite	Hardens
Silicon	0.05-1.00%	Decreases	Coarsens	Produces ferrite	Softens
Tellurium	0.01-0.10%	Increases	Refines	Produces carbides	Hardens
Tin	0.05-1.00%	Decreases	Refines	Produces pearlite	Hardens
Titanium	0.05-0.15%	Decreases	Refines	Produces ferrite	Softens
Vanadium	0.05-0.25%	Increases	Refines	Produces carbides	Hardens
Zirconium	0.05-0.30%	Decreases	Neutral	Produces ferrite	Softens

in. by 12 mesh to 8 mesh by 100 mesh), and three sizes for the stabilizing type inoculants (ranging from ¼ in. x down to 20 mesh x down). A wide range exists for the silicon-base alloys because they are friable, whereas alloy types of materials are denser and not so crumbly.

Inoculation cannot replace the alloys needed to produce special properties in the iron. Neither is it a complete substitute for good control over raw materials, melting processes, and pouring crews. Poor gating and feed conditions cannot be overcome by inoculation or alloying.

What To Watch — Precautions which must be taken when inoculants and ferroalloys are used can be summed up in the following manner:

1. Sufficient time should be allowed for the inoculant to achieve an optimum effect.

2. Alloy agents should be small enough in size to be readily soluble and yet not so small that they are blown away or oxidized before they come in contact with the metal in the vessel.

3. It is worth while to check all factors in the inoculation process frequently, especially the method of addition — feeders, funnels, and measuring devices—to be certain that no inaccuracies have been allowed to creep into the operation.

The optimum temperature still is a matter of considerable controversy. Most American practice is to add inoculants at temperatures of 2750 to 2850° F. Those in favor of the higher temperature have problems handling hot metal within the casting area.

It is, of course, necessary to hold metal after inoculation. It must be recognized that the effectiveness of the inoculant depends on the length of time between addition and pouring. In ladles of 3000 lb or more, care must be exercised that the molten iron is not held beyond the potency period of the inoculant. This effective period varies from plant to plant and should be determined accurately so that pouring is performed at the most propitious moment.

A study of this kind usually is carried out by inoculating pilot heats under standard operating conditions and taking chill samples over an extended period of time ranging up to 30 minutes. A careful evaluation of these chill samples will determine accurately the optimum lapse of time between inoculation and pouring. In some instances, the effect of inoculation was at its best after 6 minutes to 15 minutes. After a 15-minute period, the chill started to increase and at 20 minutes it was at the same levels as before the treatment.

Certain minor elements are present in all inoculants and in many ferrosilicon alloys. Aluminum is present in a range of 1.00 to 2.00 per cent. This amount of aluminum contributes to the effectiveness of the inoculant; however, some irons which may be melted under slight reducing conditions have a low tolerance for this element. The presence of aluminum coupled with improper melting conditions often leads to pinholes or the production of circumference gas. A number of firms have found it necessary to use a low-aluminum ferrosilicon material to overcome this condition.

TABLE IV—Strength of Alloy Cast Irons 1.2-in. Bars

IRON NO.	Chemical Composition, Per Cent							Tensile Strength psi	
	C	Si	Ni	Cu	Mo	Cr	V	Average, Unalloyed	Average, Alloyed
1	3.00	2.00	1.00		0.45	0.40	0.10	41,000	62,000
2	3.10	1.95	0.80		0.35	0.20	0.10	39,500	55,000
3	3.20	2.20		0.50	0.25	0.20	0.20	35,400	49,500
4	3.00	1.00	1.75		0.60		0.10	48,500	74,500
5	3.30	1.60	0.80		0.50	0.40	0.10	39,000	58,500
6	3.30	1.95		0.85	0.30	0.30	0.10	37,500	57,000
7	3.40	2.10	0.75		0.35	0.30		35,000	45,000
8	3.00	2.10		0.50	0.50			40,000	51,500
9	3.25	2.25	0.30		0.25	0.20		36,000	42,500
10	3.20	2.00		0.35	0.25	0.25	0.10	37,500	48,000

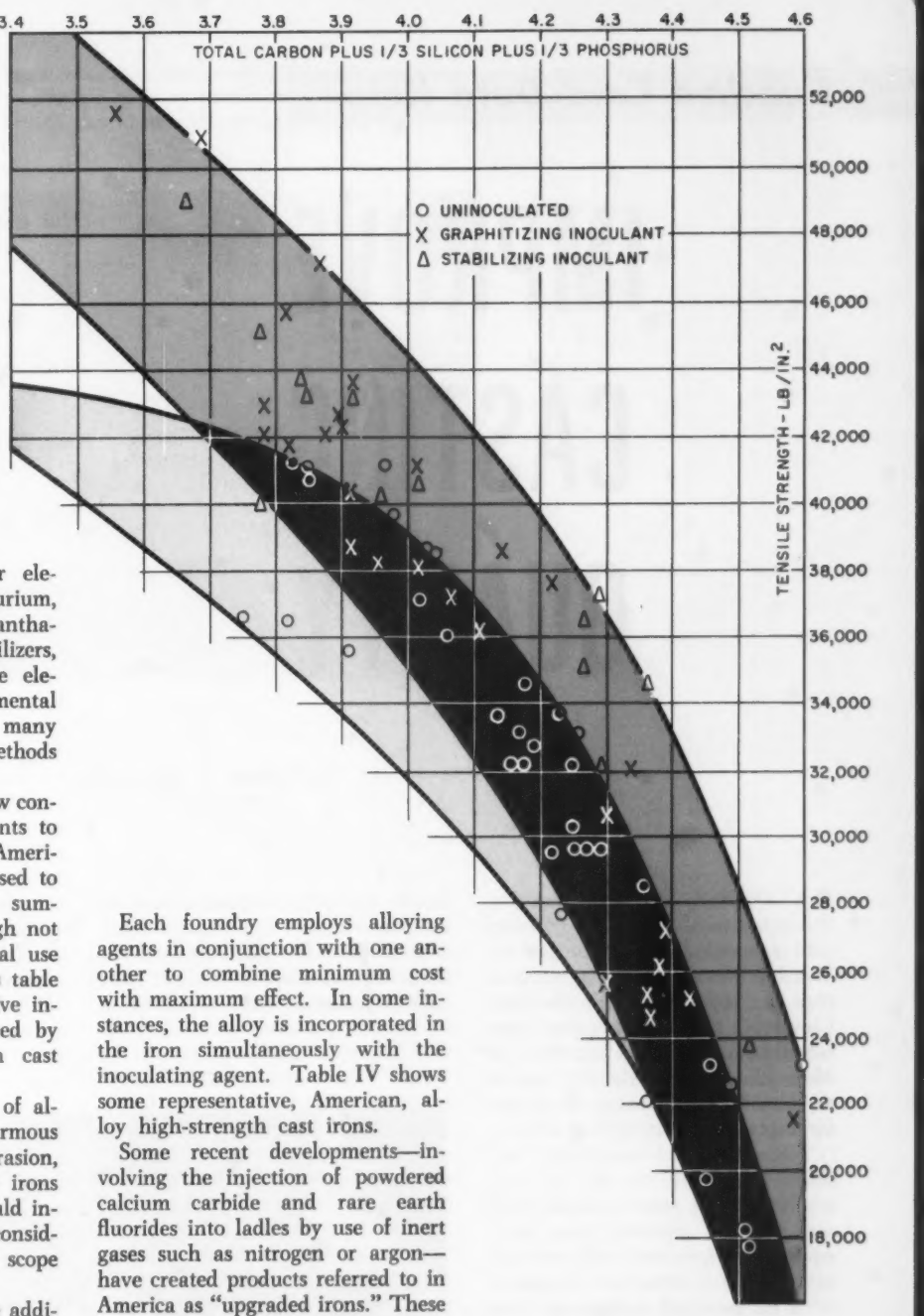


Fig. 1—Showing carbon equivalent and tensile strength relationship of base irons and irons treated with both graphitizing-type and stabilizing-type alloys

Some of the other minor elements, such as boron, tellurium, cerium, magnesium, and lanthanum, are strong carbide stabilizers, but, the application of these elements still is in the experimental stage. They can be used by many production foundries when methods have been standardized.

Alloying Agents—Let us now consider the use of alloying agents to improve the properties of American cast irons. The alloys used to achieve specific results are summarized in Table III, although not all of them are in commercial use in American foundries. This table does not provide a quantitative indication of the effect produced by the different elements upon cast iron.

Obviously, a complete list of alloy cast irons would be enormous in extent. A discussion of abrasion, corrosion, and heat-resistant irons has been avoided since it would involve a great many special considerations and lies outside the scope of the article.

The result produced by the addition of 1 per cent of an alloying element on a given gray iron in terms of tensile strength can be gaged by a formula devised by Schneidewind and McElwee. According to this means of predetermining the strength of cast iron on the basis of chemical composition, the percentage increase in tensile strength produced by the addition of 1 per cent of each alloying element is as follows: Vanadium, 45; molybdenum, 40; chromium, 20; nickel, 10; manganese, 10; copper, 10.

Each foundry employs alloying agents in conjunction with one another to combine minimum cost with maximum effect. In some instances, the alloy is incorporated in the iron simultaneously with the inoculating agent. Table IV shows some representative, American, alloy high-strength cast irons.

Some recent developments—involving the injection of powdered calcium carbide and rare earth fluorides into ladles by use of inert gases such as nitrogen or argon—have created products referred to in America as "upgraded irons." These irons, with carbon equivalents in a range of 4.20 to 4.70, have attained tensile strengths of 50,000 to 60,000 psi. Much work remains to be done in this field, but the problem is yielding to the applied research being carried on in many American foundries.

Looking Forward—The production and control of graphite sizes in cast iron is the most important problem of the immediate future. New materials and methods must be found to replace the expensive raw materials and processing agents now in use. The researcher and the foundryman are both trying to find the same thing: The perfect answer to a problem.

Unfortunately there are very few perfect answers in metallurgy. In striving for perfection both the practical man and the scientist should not lose sight of the fact that a good, workable solution now is not less important than a complete solution some time in the future.

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Punched Card Data Help

IMPROVE CASTING QUALITY

The use of data processing machines provides foundrymen with another tool for improving effectiveness of their operation. Here's one foundry's experience with this modern production tool

By ROBERT H. HERRMANN
Associate Editor

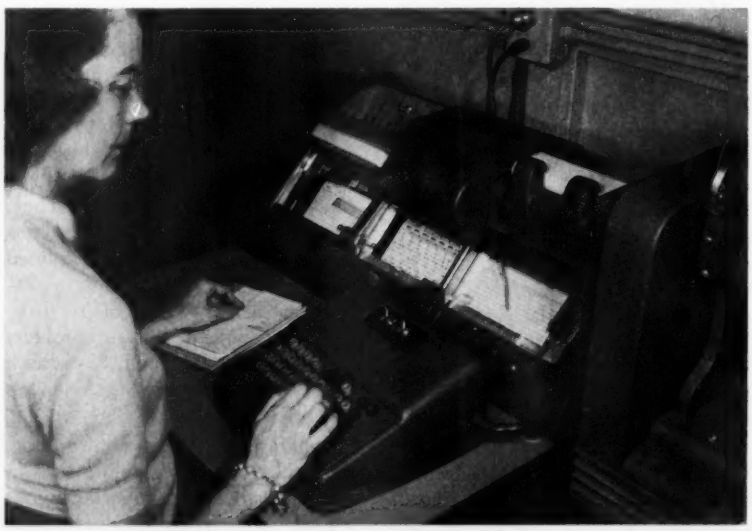
● CONTROL of casting quality through use of automatic punched card processing equipment has reduced production of defective castings at Precision Metalsmiths Inc., Cleveland, almost 50 per cent since installation of the equipment in May, 1959. That reduction was on an already low average scrap rate for investment casting foundries.

The equipment originally was leased primarily to aid in controlling casting quality. Rapid progress in that endeavor has made equipment operators and management aware of other useful applications for punched card data. Consequently, data are being gathered and punched in cards for use in analyzing job quotations and sales. Interpretation of these data is expected to be of substantial value in the company's marketing program.

From time to time special reports are prepared for study of a specific problem or for research projects in the fields of development, production, marketing, or management.

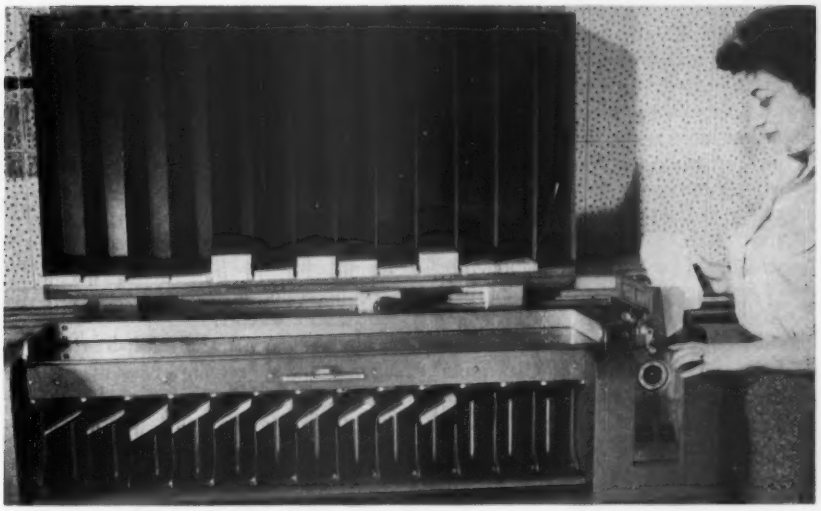
Quality Control—The marked reduction in defective castings is due to a number of factors. Detailed data are available to department heads daily, permitting corrections in processing to be effective on a current job. For the long run, the complete breakdown, analysis, and interpretation of data presented in monthly reports show areas where casting quality can be improved.

Data on all production and sample casting runs are gathered daily by inspectors who record them



First step in preparing a report or analysis is to transcribe data from source documents to a machine card in the form of punched holes

Operator places deck of punched cards in sorting machine for segregation according to predetermined machine settings to obtain data for a sales analysis report. This is the second step in punched card processing



on mimeographed forms. A separate form covers each batch of castings of a given job number and is submitted with a pan of defective castings from the batch to a process control man who classifies the scrap, notes the categories on the form, and sends it to the business machine department.

Data from the form are incorporated with other data pertinent to the job number and punched in a card. Included are the job number and lot number, the quantity of parts cast, the number of parts rejected in inspection, the reason for rejection (nonfill, surface defect, porosity, dimensional variation, poor handling during processing), type of pattern used (wax or plastic), type of mold used (ceramic shell or flask), how many molds were made, type and weight of alloy melted, with breakdown on percentages of remelt and virgin metal in the heat, and the weight of metal contained in the rough castings. The number of castings rejected by a customer and the reasons for rejection also are recorded.

More recent additions to the quality control card data are the quantity of defective castings produced from metal of a given supplier's heat number and the quantity produced in molds made from a given type of investment material. These data form the basis for a program of control over raw materials received at the foundry.

Prepare Several Reports — Daily reports based on punched card information are prepared for all jobs handled on a given day and sent to the heads of quality control, production control, and process engineering departments as well as to the chemical laboratory supervisor, who is in charge of all refractory mold material specifications. These people make any processing changes required to reduce the casting rejection rate shown in the report.

Weekly reports listing total scrap with no breakdown as to causes are prepared for the production control manager. He uses these data in these reports as a guide to adjust production to assure sufficient castings to fill the customer's order. Weekly reports also are prepared for salesmen. The reports list the number of castings rejected by customers and the reasons for rejection.

Monthly reports present a complete breakdown of data on defective castings. If the scrap rate for a given job exceeds a normal level determined over a period of years, the castings are studied by department heads and corrective action taken. In addition, management keeps all plant personnel informed on the quality control program. At the end of each month, samples of castings that have a higher than normal scrap rate are hung on a large chart near the company bulletin board. The chart carries information similar to that on the monthly report. Each month's report is summarized and carried on the chart to show improvement in casting quality during the year. A summary of the preceding year's reports is posted to permit each department to check its progress in producing quality castings.

Analysis of defective castings may indicate that a change in alloy, pattern material, or molding method may improve quality. If subsequent experiments at the foundry show that improvements can be achieved, management suggests to the customer that a change be made.

This usually is to the advantage of the customer as well as to the foundry.

The monthly reports also show trends in efficiency of the foundry operation. Comparison of these quality control reports with those compiled from data on job quotations gives an indication as to whether or not quotations are in line with production experience.

Quarterly reports are prepared for the company auditor so that he may compute the cost of defective castings. These reports list ferrous and nonferrous castings by job number and type of mold in which they were produced. Thus, scrap cost is available for the two main metal categories as well as for the two major molding methods.

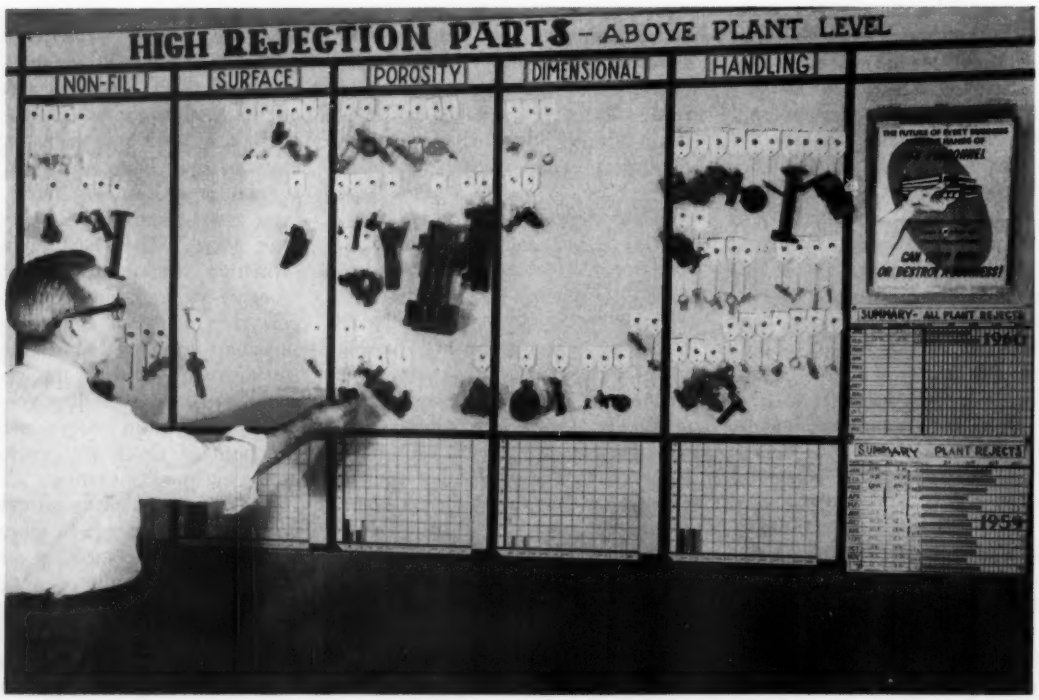
Quotation Analysis — Data put into the quotation analysis card include the date the job was quoted, the standard industrial classification number and the identification number of the quotee, the employment level of the quotee and whether he is a prospect or a previous customer, the broad alloy category in which the job falls, the specific alloy in which the part was quoted, method of casting (ceramic shell or flask molds), the price range in which the job falls, the salesman's number, and disposition of the quotation. If the job is sold, the date of sale and the assigned job number are recorded. If the order was not obtained, that fact is recorded.

At this point a second card is prepared for the company. The reasons why a job was sold or not sold are punched into the card.

Data from the quotation analysis cards are incorporated in reports for top management, the sales manager, and individual salesmen. These reports show a number of trends important to the company's marketing program. If more jobs are being sold to plants in a certain industry, or within a given size range, or if more parts are being cast with certain alloys in one type of mold as opposed to another, those facts can be noted and marketing plans made accordingly. Also, marketing and sales efforts can be refined on the basis of knowing why quotees bought or didn't buy.

Sales Analysis—Sales reports give the answer to "how's business?" When invoice data are punched into cards, management can see how business is in a number of different aspects. At Precision Metalsmiths the amount of business can be determined per customer, per salesman, by dollar amount of invoice, by piece price, by ceramic shell or flask mold, and by ferrous or nonferrous metals. Punched card data also include the invoice and job numbers and the date of shipment. Standard daily sales reports are prepared for the sales manager and top management. Special reports,

This wall chart is one method used by management to keep personnel informed on the quality control program. Every month, castings with above normal scrap rate are displayed. Monthly and yearly data summaries show trends in quality of castings



if desired, can be prepared in an hour or two, even during a sales meeting if an answer is needed to some question.

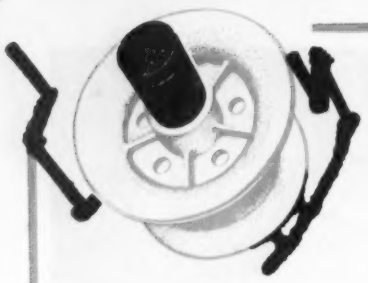
The elements of time and cost are very important in the gathering and grouping of data into usable form. Manual data handling sometimes takes so long that a summary report has lost its usefulness almost before it is completed. Also, the desired grouping and interrelating of data can be so complicated that manual handling would be far too expensive.

For these reasons Precision Metalsmiths and many other companies in the 200 to 300 employee size category could not see the feasibility of using available data to advantage. The recent availability of punched card data handling equipment on a lease arrangement at about the cost of a competent statistical clerk changes the picture. Data in practical, usable form now are available economically as a tool for increasing effectiveness of a foundry operation.

● For an extra copy of this article, until supply is exhausted, use card on Page 53

Above, control panel for the accounting machine is wired in a manner to "tell" the machine how to "read" the cards and print the report

The accounting machine, below, prints a report automatically by "reading" the holes in cards which have been sorted into the desired order



GATING STEEL CASTINGS

Our gating and risering series, in which this article is the ninth, turns this month to the gating of steel castings. This is the first of two articles to appear on that subject

By CHARLES W. BRIGGS
Technical and Research Director
Steel Founders' Society of America
Cleveland

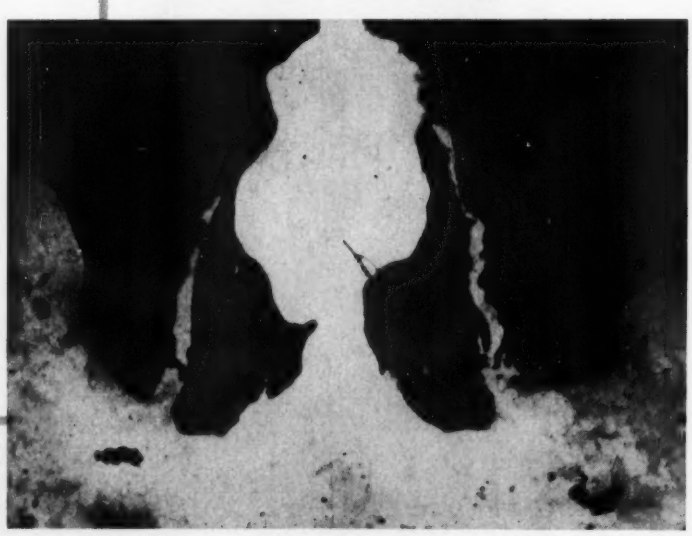
● A GATING SYSTEM for a steel casting consists of two broad divisions: 1. The downgate, consisting of the pouring basin, sprue, and sprue base. 2. The distribution system, consisting of the runners and ingates.

The downgate has two functions: 1. To supply to the distribution end of the gating system metal which is free of entrapped gases, slag, and eroded sand. 2. To establish a hydraulic pressure head which will force the metal through the remainder of the gating system into the casting.

The distribution system has four functions: 1. To decrease the velocity of the stream and thereby reduce the opportunity for metal oxidation. 2. To minimize turbulence in the mold cavity. 3. To avoid mold and core erosion. 4. To deliver molten metal to the mold cavity in a manner that will establish the thermal gradients necessary to produce sound castings.

Gates and Casting Quality—The gate system, in itself, can produce eroded sand and carry it to the mold cavity where it lodges in the casting surface. The sprue will be eroded if it is not kept full and the molten steel impinges on it at various points in its fall. Sharp changes in the direction of the gate, such as the sharp bend at the bottom of the sprue as it joins the runners, will cause erosion. Constrictions, or

Fig. 1—Sand glows as the low-temperature bond burns out in those mold areas which have been traversed by molten steel



choke areas, produce a rise in pressure, and the sand is more easily eroded from the gate walls.

Safeguards can be taken to prevent gate erosion, or at least to hold it to a minimum, by considering the following items during preparation of the mold:[1]

1. Tile tube sections can be employed for the sprue or for the entire gating system. This usually is done in the molding of large castings. Also, tile gates are increasing in use for medium to small size steel castings. New facing sand usually can resist metal erosion better than reused sand and is, therefore, recommended for forming the gates.

2. Hard mold ramming in the vicinity of gates is an important necessity. Gate surfaces should be rammed harder than the mold cavity, if possible.

Fig. 2—Mold erosion. Gate systems: Central sprue, 1.4 in. diam; double runners, 1.4 in. diam each; and ingates 1 in. diam each. Drag surface

3. The surface of the gate system must be smooth. Battered and rough gate patterns will result in easily eroded projections of sand in the gate surface. Also, the various portions of the gate system must be carefully and fully matched. If they are not, the projections act as obstructions in the path of the stream and the stream's force acts to remove them from the path in sizable pieces, or wears the projection away as a continuous removal of sand grains.

4. Most of all, the gate system must be free from loose sand prior to the entry of the molten steel.

These are fundamental considerations in the making of a mold. It has been said, however, that foundries are very slack in observing the fundamental precautions of molding and that eroded and included sand is present in castings because of failure to observe molding fundamentals rather than from the application of unscientific gating systems.

The practice of blowing out gate systems with air after molding, the inspection of molds at flask closing times, and the placing of coverings over riser and sprue openings are excellent quality control operations and improve casting quality. The use of wells at the sprue base, or steel, or brick splash plates also help eliminate mold erosion resulting from drastic changes in gate direction and metal flow.

Causes of Mold Erosion—The gate system can be responsible for erosion of the mold cavity by the metal stream emerging from it. In some cases the eroded surface ahead of the ingate is considerable. The stream emerging from a gate generally moves with a sidewise, whiplike motion. Consequently, the sand over which the stream edges run is alternately covered and uncovered by metal, while the sand under the central portion of the stream remains covered.

The temperature of the sand subjected to the action of the stream edge is raised and lowered so that the room temperature bonds, such as corn flour, burn out, as is shown in Fig. 1. However, the temperature is not high enough to fuse the sand grains or bentonite into a high-temperature bond. Sand in this condition is eroded easily by the stream and is carried along to lodge in the cope or other casting surfaces. The metal forms a rough surface resulting in scab-like defects or actual lumps where the erosion takes place.

That portion of the sand over which the stream center runs receives enough heat to become bonded. Consequently, the stream movement does not disturb the sand grains. The casting surface formed against this area is smooth. The photograph of the plate casting in Fig. 2 shows these effects. Under certain cases of gate design the entering stream weaves to such an extent that there is no stream center and the eroded area is extensive.

Fig. 3—Steel flow pattern for mold tilted at 10-deg incline: A—Drag surface; B—12 seconds after pouring

It becomes apparent that gate design must take into consideration more than the mere necessity of delivering metal to the mold cavity. The influence of temperature changes in the sand, as it is disturbed by the motion of the molten metal, is of great importance. For example, Fig. 3 shows an excellent casting surface when the plate casting is poured uphill. In this case the deleterious effect of the stream motion is minimized, and the sand has a chance to achieve a high temperature bond since it always is covered by the metal.

Certain interesting facts have been learned by research concerning mold erosion:

1. Single ingate systems cause more mold erosion than multiple ingate systems.

2. The smaller diameter ingates produce the most mold erosion regardless of the gating system employed.

3. The double ingate system with the central sprue consistently produces less mold erosion than a system of offset sprue, or a single ingate system of similar ingate sizes (Fig. 4).

4. Fast filling of the mold with low velocity ingates produces castings with a minimum of mold erosion (Fig. 4).

5. Cold metal flows more sluggishly, exhibits a broader stream across the mold face, and produces less erosion than hot metal. The higher the steel temperature, the

Fig. 4—Low-velocity double ingate system with minimum erosion of mold. Sprue 1 in. diam, runners, 1 in. diam each, and ingates 1.4 in. diam each. Drag surface of the casting

more severe the mold erosion. This condition is especially true with the single ingate system. It is not nearly as noticeable or important in double-gated systems with a central sprue.

6. A short sprue produces less splashing and whipping and, therefore, less mold erosion than a long sprue. This condition is noted primarily in gate systems not having wells at the base of the sprue. However, beyond a certain sprue height, further increases in the height result in cold metal emerging from the gates initially because of heat loss of the sprue wall, and the erosion is somewhat less.

7. The use of top finger gates with free metal fall results in considerable mold erosion (Fig. 5).

How To Avoid Erosion—Research studies on the machinability of cast steel surfaces have shown that sand occluded in the casting surfaces adversely affects machinability. Therefore, it is advisable to employ a gating system that will result in the least possible mold erosion. A summary of the previously presented information would show that the best gating system would be a double ingate with the central sprue; a rapid filling, low-velocity system of large gates and with the ingates larger than the runners; short sprues or the employment of an enlarged well at the base of the sprue; and gating into the casting at a place where the metal can cover the drag quickly and completely to minimize the stream motion.

Eroded sand can be eliminated or reduced materially if these principles are incorporated into the gating system for steel castings. Of particular importance is the use of a nonpressurized gate system that permits uniform, fast delivery of molten steel. A nonpressurized system would be a 1:2:2 or 1:4:4 ratio of sprue to runner to ingate areas. However, such gating systems favor oxidation of the metal and may be partially favorable to the formation of the ceroxide defect. Also, the flow is nonuniform when the gate area equals the runner area.

A slight change in the nonpressurized system of 1:2:2 to the gating ratio of 1:2:1.5 will produce steel castings nearly free from erosion, will minimize oxidation in the gating system, and will produce uniform flow.

It has been stated in the literature[2] that the gating system for steel castings need not be designed to minimize metal agitation and aspiration of mold gases. While liberties may be taken with the gating design, the unpressurized systems are recommended because they offer lower metal velocities and, hence, less mold erosion. Ladle slag and the ceroxide problem may require a slight choking of the 1:2:2 system to 1:2:1.5 but in no event much less than this value.

A gating system with the runner area larger than that of the sprue is not a difficult one to construct, especially if use is made of the popular double runner leading from the sprue. Such an acceptable system would be one such as shown in Fig. 6.

Some tests on steel castings[3] have been made using the double runner and centrally located sprue with cope ingates and drag runners and a gating ratio of 1:3:3. Excellent results were obtained by this system with all castings free from eroded sand. Modifications were then made to a system of 1:1:0.7, employing an enlarged sprue base and a drag runner and cope ingates. The enlarged sprue base acts to cut down the pressurized system to make it comparable to the 1:2:1.5 system suggested above. General adoption of this 1:1:0.7 system for commercial castings reduced the percentage of castings requiring welding from about 10 to 2 per cent and also provided a satisfactory yield of about 70 per cent.

Effect of Gating on Porosity—The presence of porosity and gas cavities in steel castings usually is not associated with gating problems. Normally the cavities are the result of steelmaking operations. However, there are circumstances in relation to the application of gating systems which are responsible for isolated gas cavities in steel castings and which can not be traced to steelmaking or solidification.

For example, a foundry reported the presence of gas cavities in a plate-like yoke casting produced in green sand poured directly down the riser. A change to a tapered sprue, an enlarged sprue base with two runners in the drag, and ingates in the cope, resulted in perfect castings without gas cavities or eroded sand. It is true that the casting yield

Fig. 5—Freely falling metal from two top finger gates causes mold erosion. Height of the fall, 6 in.

was lowered, but castings free from defects resulted.

The gas cavities in this case were the result of trapped air within the casting. It has been shown that a number of gate designs are responsible for air being carried along with the molten metal. This air may be trapped by the steel in molds or portions of molds which are not vented.

The horn gate is probably the greatest single cause of gas cavities resulting from trapped air. Metal enters the mold in a fountain-like jet when the horn gate is used. Reversing the horn gate does not eliminate the jet effect, but merely reduces the height of the fountain.

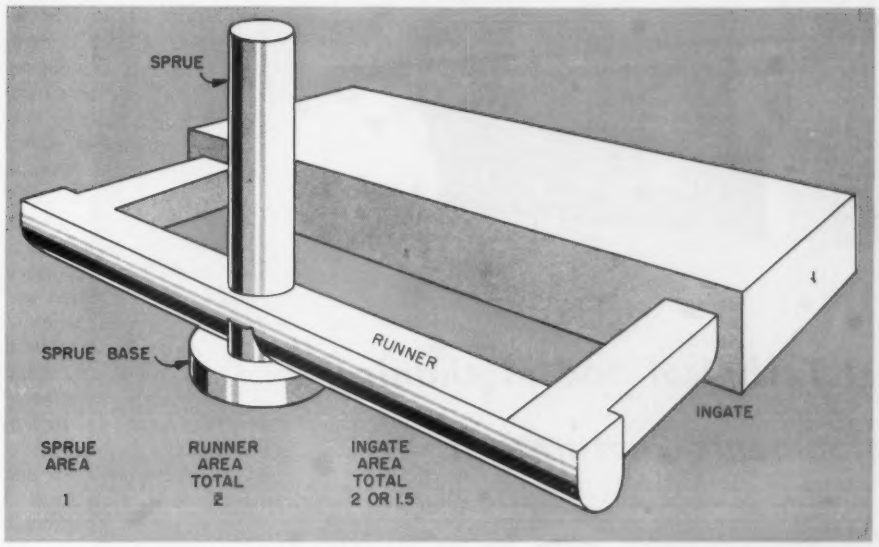


Fig. 6—Suggested gating system for steel castings of high quality uses a runner area larger than sprue area

Horn gates are poor methods of gating castings because of the severe agitation that is produced, and they are not recommended for gating steel castings.

Gas Affects Mold Surface—The location of gates into the mold cavity may be responsible for mold gas formation, and the gas could dislodge sand from the mold, producing castings with occluded sand. This situation can occur if the gate is directed into the mold cavity at a position where the molten steel heats a localized section of the mold to such an extent that gas formation results from decomposition of organic matter in the sand, as well as from the moisture present. Then, if the localized section is covered quickly by molten steel, the pressure of the gas formed is sufficient to force bubbles of gas into and through the molten metal. The same action may dislodge sections of the sand mold face to form scabs or other surface defects.

A good example of the gas-sand erosion mechanism can be seen in Fig. 7. The metal in the trough heats the mold adjacent to the trough, decomposing the organic material and changing the water to vapor. The gas goes through the steel when it flows across the heated area, with the bubble action resulting in mold face breakdown. Considerable eroded sand can be seen on the metal in Fig. 7D.

Every effort should be made to plan gate systems so that metal will not flow over mold areas that have been heated by the molten metal, even for a short time, before being covered by metal. Molten steel that covers the mold cavity surfaces without prior heating by radiation does not produce the gas erosion to any great extent. This is thought to be due to the fact that the ferrostatic head always is greater than the pressure necessary to form bubbles.

If gas pressure does develop in a mold, it can be lowered below the bubble-forming pressure by venting the mold with holes which come close to the mold-metal interface.

This article on gating steel castings will be concluded next month.

REFERENCES

1. Caine, J. B., "Application of Gating and Risering Studies to Production Castings," *Symposium on Principles of Gating*, AFS, 1951, p. 57.
2. Johnson, W. H., Bishop, H. F., and Pellini, W. S., "Relation of Casting Quality to Gating Practice," *Symposium on Principles of Gating*, AFS, 1951, p. 31.
3. Lowe, J. H., and Austin, J., "Application and Value of Gating Principles," recommended by the Battelle film "Fluid Flow in Molds for Steel Castings, *Symposium on Principles of Gating*, AFS, 1951, p. 61.

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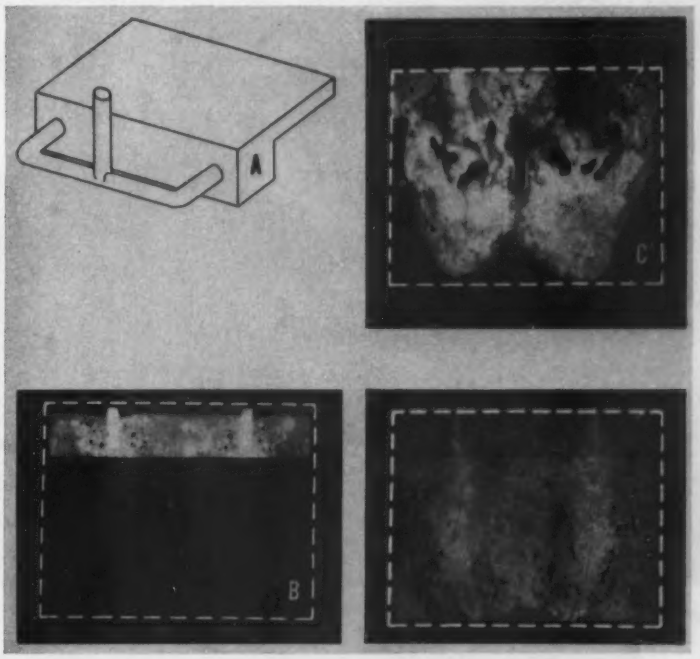
Fig. 7—Flow of steel into trough and across plateau. Note gas bubbles close to edge of plateau in C and eroded sand in D. A—Casting design: Sprue diameter, 1.4 in.; runner diameter, 1.4 in.; gate diameter, 1 in. Pouring temperature, 2950°F: B—15 seconds; C—21 seconds; D—30 seconds



Latest Technical and Mechanical Developments Featured at

Congress and Show

● FOUNDRYMEN attending the 64th Castings Congress and Exposition of the American Foundrymen's Society in Philadelphia had an excellent opportunity to appraise latest developments in those foundry practices which have contributed to the industry's progress in recent years.

The well diversified program of more than 100 technical papers and the exhibits of foundry equipment, supplies, and services indicated that constant refinements are being made in technical and operating practices as well as in the tools required to conduct them.

Attendance at the five-day meeting topped 12,000.

Annual Business Meeting — Charles E. Nelson, national AFS president, reported on recent society activities in his presidential address. Current membership approximates 13,000 and there are 60 chapters including 13 student chapters. Through adoption of a new policy, the travel time of national officers has been greatly reduced to permit greater concentration of their time on society affairs.

The Training and Research Institute in its first three years will have conducted 57 courses in Chicago and one course in each of the society's seven regions. Enrollees totaled 1400 from over 500 companies. Plans for building a new T & R I building in Des Plaines have been deferred.

Mr. Nelson announced changes in the policy for holding foundry shows, effective after 1962 commitments have been fulfilled. Engineered castings shows, which have been conducted in the last two off-show years, will be discontinued, and unlimited shows will be held in two of every three years.

NORMAN J. DUNBECK
. . . president

ALBERT L. HUNT
. . . vice president

Officers and Directors—Norman J. Dunbeck, vice president, International Minerals & Chemical Corp., Skokie, Ill., was named AFS president at the annual election of officers. Mr. Dunbeck, a 1924 graduate of the Catholic University of America, joined Eastern Clay Products Inc. in 1926 as plant superintendent. He held the positions of service engineer and production

Group scenes show crowds at the registration desk on opening day at the 1960 AFS Castings Congress and Exposition, held in Philadelphia May 9-13

NEW AFS DIRECTORS

WALTER E. SICHA

THOMAS T. LLOYD

WARREN C. JEFFREY

JAMES T. MOORE

manager and was vice president of the organization in 1951 when it was acquired by International Minerals & Chemical Corp. At that time he was appointed vice president of the Industrial Minerals Div.

New vice president is Albert L. Hunt, executive vice president, Superior Foundry Inc., Cleveland. After attending Washington University, he joined the National Bearing Div., American Brake Shoe Co., St. Louis. Mr. Hunt was works manager of the St. Louis plant for 11 of his 24 years with that company. He was vice president in charge of operations when he joined Superior Foundry in 1959.

The following men were elected national directors for three-year terms:

Robert R. Ashley, foundry manager, Detroit Controls Div., American Radiator & Standard Sanitary Corp., Stratford, Conn. Mr. Ashley entered the foundry industry in 1940 as an apprentice at Waukesha Foundry Co., Waukesha, Wis. He joined the Detroit Division in April, 1959.

Arthur E. Falk, managing partner, Centrifugal Castings Co., Long Beach, Calif. He was graduated from the University of Nebraska. Prior to founding his own firm, Centrifugal Castings Co., in 1943, Mr. Falk was foundry superintendent, D & M Machine Works, Torrance, Calif.

Warren C. Jeffrey, product development manager, McWane Cast Iron Pipe Co., Birmingham. A graduate of the University of Alabama, he has served foundries in the Birmingham area since 1937. From 1950-60 Mr. Jeffrey was associated with the University of Alabama as professor of metallurgy.

James T. Moore, vice president, Wells Mfg. Co., Chicago. Mr. Moore attended Northwestern University and joined his present company in 1934. He advanced through several positions to the office he now holds.

Walter E. Sicha, chief, Cleveland Research Div., Aluminum Co. of America, Cleveland. He earned his B.S. degree in metallurgy at Case Institute of Technology and his M. S. degree in metallurgy at University of Michigan. He joined Alcoa as a metallurgist in 1929.

Donald E. Webster, foundry superintendent, American Laundry Machinery Co., Rochester, N. Y. Graduated from Mechanics Institute (Rochester Institute of Technology) in 1923, Mr. Webster was associated with Whitehead Bros. Co., Rochester, prior to joining his present company in 1929.

Thomas T. Lloyd, vice president in charge of operations, Albion Malleable Iron Co., Albion, Mich., was elected director-at-large for a three-year term. Mr. Lloyd holds the same position at Muncie Malleable Foundry Co., Muncie, Ind., a new division of Albion Malleable. He was graduated from Cornell University and has been with Albion Malleable since 1936.

An eighth new director is E. Claude Jeter, Ford Motor Co., Dearborn, Mich. Shortly before the annual meeting he was appointed to fill the unexpired term of Louis J. Pedicini, who resigned because his work with Lester B. Knight & Associates, Chicago, is outside this country. Mr. Jeter joined Ford at Highland Park, Mich., in 1928, later was Dearborn Iron Foundry manager, and in 1950 went to Cleveland to manage Ford's new foundry there. Last year he was made manufacturing manager of foundries with headquarters in Dearborn.

Apprentice Awards — Entries in the 1960 Robert E. Kennedy Memorial Apprentice Contest totaled 461 from 182 companies. Eighteen AFS chapters conducted contests, and 109 patterns and castings were

Charles E. Nelson, retiring AFS president, is shown conducting the annual business meeting

ARTHUR E. FALK

ROBERT R. ASHLEY

DONALD E. WEBSTER

E. CLAUDE JETER

entered in the final judging. First-place winners in the five classes of competition were present to receive their awards from President Nelson. Top three winners in the divisions were as follows:

Wood Patternmaking — Adam Kravetz, Progress Pattern Co., Detroit; Ronald Koehnle, Reliable Pattern Works, Bedford Heights, Ohio; Duane Garn, Campbell Pattern Co., Santa Fe Springs, Calif.

Metal Patternmaking—Charles D. Lee, Caterpillar Tractor Co., Peoria, Ill.; Ronald J. Sekala, Ford Motor Co., Berea, Ohio; John M. Puszykowski, Chevrolet-Saginaw Grey Iron Foundry Div., General Motors Corp., Saginaw, Mich.

Iron Molding—Arvo Tynilainen, John T. Hepburn Co. Ltd., Toronto, Ont.; Rodney R. Kuykendall, Caterpillar Tractor Co., Peoria, Ill.; Malcolm Snyder, Atlas Foundry & Machine Co., Tacoma, Wash.

Steel Molding—James C. Leinss, Maynard Electric Steel Casting Co., Milwaukee; James E. Gift Jr., Dodge Steel Co., Philadelphia; Terry S. Baich, Clark Equipment Co., Buchanan, Mich.

Nonferrous Molding — Peter E. Durben, and Louis J. McKee, Eck Foundries Inc., Manitowoc, Wis.; Dennis M. Jenniges, Puget Sound Naval Shipyard, Bremerton, Wash.

Citations and Awards—A feature of the annual meeting was the presentation of AFS Service Citations to William M. Ball Jr., R. Lavin & Sons Inc., Chicago, for outstanding and inspirational services to AFS, its chapters, and the nonferrous castings industry, and to Victor E. Zang, Unitcast Corp., Toledo, Ohio, for tireless and continuous promotion of co-operative technical endeavor.

Awards of Scientific Merit were presented to George P. Halliwell, H. Kramer & Co., Chicago, for noteworthy achievements in the field of brass and bronze casting and for outstanding technical services to the AFS, and to George A. Timmons, Climax Molybdenum Co., Detroit, for notable contributions and services to the society and the ferrous foundry industry in the fields of heat treatment and alloying of gray iron.

Hoyt Lecture — Immediately following the annual meeting, the Charles Edgar Hoyt Memorial Lecture was presented by William J. Grede, chairman, Grede Foundries Inc., Milwaukee. The subject was "Where Do We Go from Here?"

Mr. Grede, who also is president of J. I. Case Co., Racine, Wis., and past president of the National Association of Manufacturers, charged the foundry industry with hiding its

William J. Grede, chairman of the board, Grede Foundries Inc., Milwaukee, delivered the Hoyt lecture. He spoke on "Where Do We Go From Here?"

Victor E. Zang, left, and William M. Ball Jr., second from left, were recipients of AFS Service Citation Awards. Awards of Scientific Merit were presented to George A. Timmons, second from right, and to George P. Halliwell, right

light under a bushel. He criticized the industry for being too much concerned with security for itself and with possessing too little courage to move into new fields. He called on foundries to engage in a joint effort to familiarize the nation with what they can do, the advantages of their products and to improve the training and education of foundry personnel.

As a basis for this admonition, Mr. Grede cited the following statistics. Comparing averages for the years 1956-58 with those of 1946-48, population increased 20 per cent while the production of ferrous castings was practically unchanged. Output of copper-base castings declined 19 per cent during the decade, while aluminum alloy castings jumped 58 per cent and magnesium 258 per cent. Comparing this picture with substantial gains in many other branches of the metalworking industry, he said the foundry industry faces the challenge of recapturing the market that went to other forms of fabrication.

Mr. Grede does not foresee that imports of castings as such will produce much impact on the American economy, but it is impossible to overlook the castings that are imported in the form of finished goods ranging from machine tools to automobiles.

Dinners—Annual dinner meeting of the Sand Division attracted special interest this year because of the scheduled speaker—Dr. Y. A. Nekhendzi, head of Chair of Foundry Production, Leningrad Polytechnic Institute. Dr. Nekhendzi was not present to give his paper, which discussed various phases of Russian foundry operations.

By 1965 the USSR expects to produce 16 million tons of cast iron and 4 million tons of steel castings annually. Current output is 10 and 3 million, respectively. U. S. foundries last year shipped 12.3 million tons of iron and 1.4 million tons of steel castings.

The trend in Soviet Russia, according to Dr. Nekhendzi, is toward large specialized foundries. This trend promotes automation and high productivity, provides better labor control, eliminates the smaller shops, and curtails manual labor. Number of foundries is expected to be cut 20 per cent during the next five years.

Some 1750 foundry engineers are entering the industry annually in Russia, including 850 specializing in metallurgy and 920 in mechanical operations. About 10,000 undergraduates currently are studying foundry engineering, 3200 of whom are receiving their training through correspondence schools.

Papers also were prepared by authors from several other countries. The official paper from the Institute of British Foundrymen outlined British diecasting practice in aluminum. It was prepared by R. R. Woodward and H. J. Proffitt, High Duty Alloys Ltd. Other British authors included W. B. Parkes and R. G. Godding, British Cast Iron Research Association, and E. C. Lewis, Alumnasc Ltd.

Prof. Albert De Sy, University of

Ghent, Belgium, K. Schneider of Aluminiumwerke, Nuernberg, Germany, and Profs. A. J. Anderson and G. J. Sutton of the University of New South Wales, Australia, were among other foreign authors.

In honor of the many foreign visitors attending the Congress, an international reception was tendered them by AFS on Monday evening.

A feature of the annual Alumni dinner was the presence of nine past presidents of the society at the speakers' table. Lewis H. Durdin, president 1958-59, presided. Other presidents at the speakers' table and their years of service to the society were as follows: Wyndham R. Bean, two terms 1920-22, the oldest living past president; Dr. Guilliam H. Clamer, 1923-24; Hyman Bornstein, 1937-38; Ralph J. Teetor, 1944-45; William B. Wallis, 1948-49; Edwin W. Horlebein, 1949-50; Walter L. Seelbach, 1951-52; I. Richards Wagner, 1952-53. Other past presidents in attendance were Frank J. Dost, 1954-55; Frank W. Shipley, 1956-57; Harry W. Dietert, 1957-58. The Alumni group is made up of past officers and directors, those who have been honored by the society, and present and past staff members of the society.

Annual Banquet—AFS President Charles E. Nelson presided at the annual banquet, highlight of which was the presentation of the society's gold medals. Award winners were Sam F. Carter, American Cast Iron Pipe Co., Birmingham, who received the William H. McFadden Gold Medal; Waldeck W. Levi, consultant, Radford, Va., recipient of the Thomas W. Pangborn Gold Medal, and Theron D. Stay, Reynolds Metals Co., Cleveland, the Joseph S. Seaman Gold Medalist.

Banquet speaker was Dr. Bergen Evans, Northwestern University, Evanston, Ill., whose subject was "Where Do We Go with Brains?"

Reports on technical papers presented at the Philadelphia meeting start on page 203.

Apprentice contest first-place winners. Standing, left to right, are Adam Kravetz, Arvo Tynilainen, and Charles D. Lee. Seated are James C. Leinss and Peter E. Durben, left to right.

Inspecting prize-winning entries are, left to right, E. C. Gruetzmacher, vice president, Universal Foundry Co.; Kenneth Henry, plant manager, G. H. R. Foundry Div., and B. D. Claffey, vice president of Dayton Malleable Iron Co.

Interest is Diversified at

AFS EXPOSITION

● MORE THAN 200 exhibitors presented a spectacular display of new equipment, supplies, and processes at the 1960 AFS Castings Congress & Exposition in Philadelphia, May 9-13.

Operating Exhibits — Operating equipment is a tradition at AFS shows, and approximately 40 per cent of the exhibitors in Philadelphia actually demonstrated their products. These companies made shell, self-curing, and CO_2 process cores, conditioned sand, made molds, melted metal, moved materials, and poured castings.

Others demonstrated casting finishing, patternmaking, casting inspection, and other operations. A number of firms sponsored joint exhibits in which their equipment and supplies worked as a team to highlight their applications.

Among the displays which excited considerable attention were several at which shell coremaking equipment was operated to produce cores ranging from very small to some nearly 3 ft high.

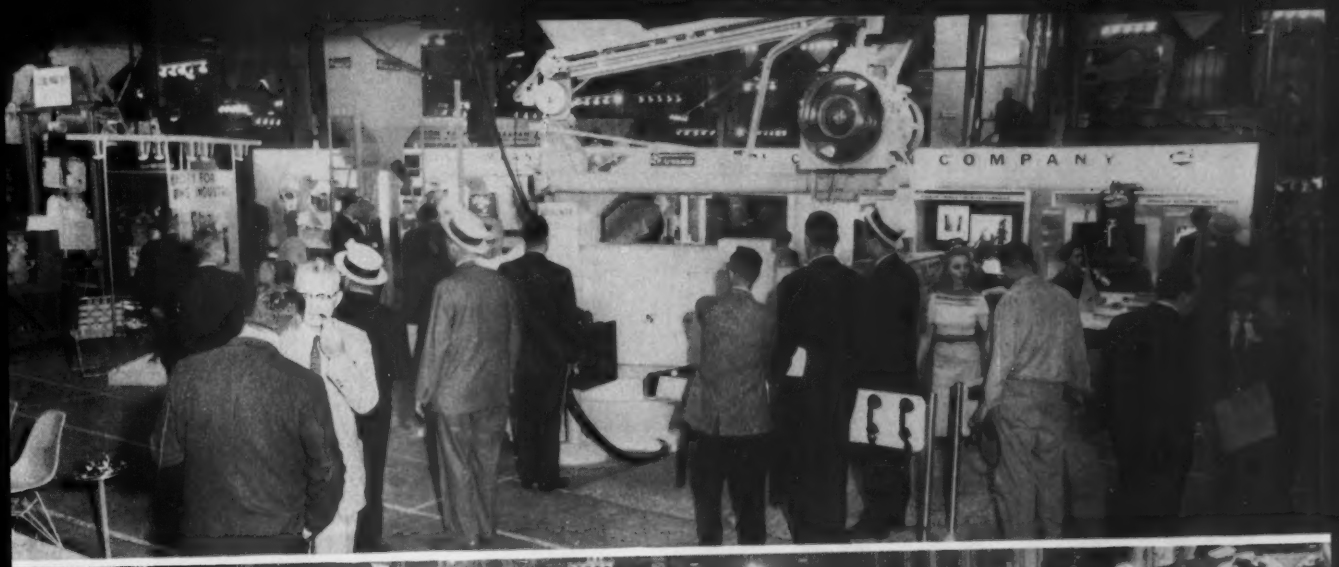
Foreign Displays — One of the largest, comprehensive exhibits was offered by an English company. It featured a complete, operating sand foundry including automatic molding machines, coreblowers, shell molding, sandrammers, mold conveying, and sand preparation.

All told, manufacturers from five European nations presented their products. Countries represented included England, Belgium, Holland, Switzerland, and Germany.

Closed Circuit TV—One American exhibitor of custom designed and automated material handling equipment solved the problem of showing its complex equipment by installing a closed television circuit to enable visitors to watch an automatic mold handling system in operation in a foundry in Camden, N. J. This system produces seventy-two 14,000-lb molds per hour with seven operators.

More Automation—It was obvious to foundrymen who attended the show that electronic controls and instrumentation are on the increase in the foundry industry. The remarkable prominence of such controls indicates clearly that automation is a growing factor in casting production, even in smaller foundries, in such operations as molding, coremaking, melting, and quality control. One company showed a tape-programmed sandslinging unit.

New Binders — Among the new supplies displayed, much interest was evidenced in new self-curing core binders, shown by at least two companies. Cores made with these materials require no baking. In conjunction with one of these products, an equipment manufacturer also exhibited a bench-type coreblower which produced sample cores made with the new binder.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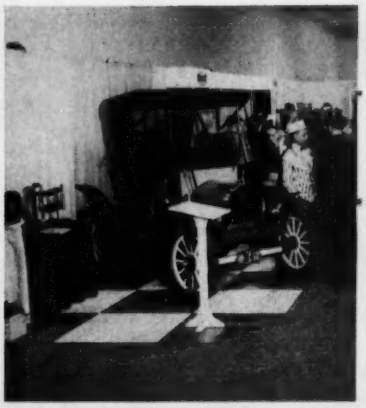

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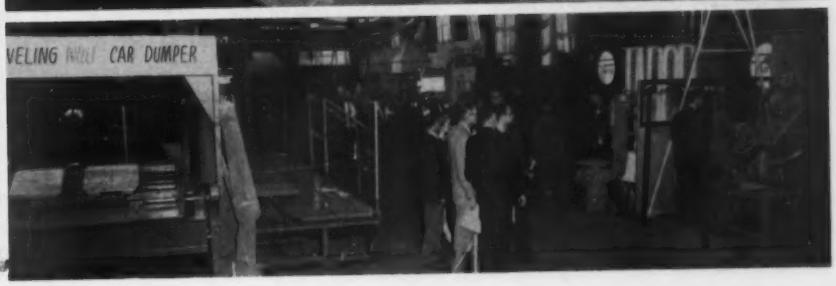
AFS EXPOSITION



Questions and Answers

Cast-in inserts must be clean and dry to eliminate trouble from blowing . . . Capacities of taper-side ladles can be determined mathematically . . . Leaky tubes are problem . . . Making vaned impeller castings is not easy . . . Centrifugal castings

Keep Inserts Clean and Dry

We are considering production of a gray iron casting containing a steel insert and will appreciate information on published literature or technical papers relating to the subject.

Although occasionally mention has been made of casting-in steel inserts in gray iron castings, we do not recall extensive discussion of the matter. The most common trouble—that of blows when the molten metal comes in contact with the inserts—can be eliminated by seeing that the latter are dry, clean, and preferably slightly above the temperature of the molding sand. That precaution will prevent condensation of moisture from the damp sand.

Cleanliness means that the insert must be free from oil, grease, rust, scale, etc. Usually an abrasive blasting operation will do a good job in that respect. It is also a good practice when inserts are being used to delay closing the mold until just before it is to be poured. If molds must stand over night, the inserts should be heated by application of the torch before pouring.

Some Alloy Characteristics

We would like to know if you have any information available on the shrinkage characteristics of No. 214 aluminum-base alloy containing about 4.1 per cent Mg?

According to available information, the No. 214 aluminum-magnesium alloy is more difficult to cast than many of the other aluminum-base alloys, and additional precautions in foundry technique must be employed to insure freedom from shrinkage, dross, and oxidation of the magnesium. The alloy also has poor pressure tightness, and fair fluidity and resistance to hot cracking.

Measuring Ladle Capacity

Some time ago you presented in your magazine a nomograph for determining capacities of iron foundry ladles from 500 to 8000 lb. We wonder if you have one for steel ladles from 100 to 8000 lb? Incidentally we have found that a cubic inch of molten steel weighs approximately 0.245 lb.

We regret that we do not recall and have been unable to locate the nomograph relating to ladle capacities. Years ago FOUNDRY published some tables on capacities of ladles, but they covered a larger range of sizes. We have seen some other tables published by ladle manufacturers giving capacities of standard size ladles for steel. These ladles range in size from 20½ in. diam at the top, 18 in. diam at the bottom and 20½ in. high to 86 in. diam at the top, 77 in. diam at the bottom and 72 in. high. Capacities vary from 760 lb to nearly 49,000 lb.

With a little calculation it is not difficult to determine the volume and weight capacity of any taper-side ladle. It is based on determining the volume of the frustrum of a cone, and the formula is

$$\frac{1}{4}\pi h[(r + r_1)^2 + \frac{1}{3}(r - r_1)^2]$$

where h is the depth, r the diam at the top, and r_1 the diam at the bottom.

A shorter formula—not as accurate but sufficiently so for the purpose is

$$0.7854\,h\left(\frac{D+E}{2}\right)^2$$

where D is the diam at the top, E the diam at the bottom, and h is the height.

The figure you give for the weight of a cubic inch of molten steel is somewhat less than that generally employed—0.25 lb. Temperature, of course, is a factor as indicated by Briggs, who states that molten steel weighs 0.2516 lb per cu in. at 2912° F, and 0.2559 lb per cu in. at 2721° F—a difference of about 0.00225 lb per cu in. per 100° F.

Tubes Leak Under Pressure

We are sand casting bronze tubes about 4 in. in diam and 15 in. long in 88-6½-1½-4 bronze which must withstand 75 psi steam pressure. The castings when machined appear all right, but under a pressure test show leakage. When the castings are broken, the grain of the metal does not appear to be dense. Metal is melted in oil-fired crucible furnaces, and temperature is checked with a pyrometer.

Lacking a specimen for examination we can only guess as to the probable cause of leakage. Based on your statement that the machined surface does not show evidences of porosity and the fracture appears open, we believe that the trouble is lack of feed.

Although no information is available on your method of gating, we believe that the best results will be obtained if the tubes are stood on end and poured through a ring of six pencil gates ¼ in. in diam. Gates are equally spaced and situated midway between the two peripheries.

Feeding head or riser on the casting is obtained by making the pattern a few inches longer, or by drawing the present pattern up the required distance during the molding operation. As a further means of obtaining a solid, fine-grain struc-

ture in the tube, you might try a cylindrical cast iron chill to form the hole or bore. For easy removal of the chill core, it is split into four quadrants which are separated by thin strips of asbestos paper.

Impeller Cores Cause Trouble

We have had tough luck in trying to produce 10-in.-diam, seven-blade impellers in stainless steel. Thickness of the sidewalls is 5/16 in., core thickness ¼ in. We have cast the impellers flat, on edge, and in vertical positions, and have gated them with a circular runner and seven ingates, or in both walls at the bottom (when cast on edge). In each case the cores would either float or break, causing blows.

Cores were made in CO_2 sand, oil-sand and blower sand; with or without 16-gage wire between blades; with or without 1/16-in.-diam nylon vents; supported or not by stainless chaplets, but to no avail. We would like to know how those cores can be made (sand mix and coremaking procedure), and also the proper heading and gating practice. Any information will be appreciated greatly.

Your problem is one that has faced a number of steel foundries. Since they have been cast successfully in brass and bronze, the assumption is that they also can be cast in steel. However, the higher heat input and the high rate of input into the core due to the high pouring temperature of the steel frequently poses an insurmountable heat transfer problem. Core thickness is quite critical. A core ¼ in. thick, as in your casting, will cause trouble while one ⅜ in. thick might be used satisfactorily.

Of the several types of cores you mention, the CO_2 process should serve best, and possibly your practice can be adjusted to provide more satisfactory results. The cores in question are quite thin and may be overgassed. Therefore, we suggest you try extremely short gassing periods; allow the cores to stand for a period, or give them a short bake to develop the desired strength. Overgassed cores or molds tend to be friable and somewhat weak.

Cores for small impellers usually are made in one piece with a diameter about 2 in. larger than the actual diameter to form a circular core print extending about 1 in. beyond the actual diameter of the impeller. That arrangement plus the hub print give excellent support to the core.

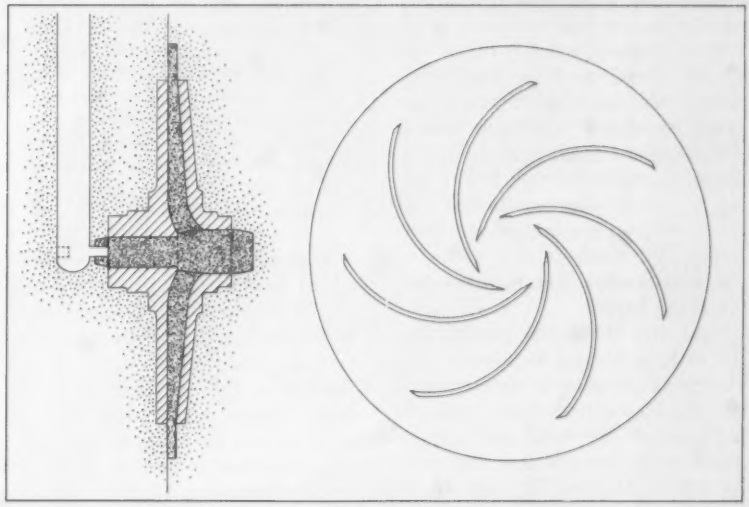
As to gating, we suggest pouring the impeller on edge, running the steel into a riser placed close to the hub, which is attached to the hub by a short mouth or gate.

If you still have trouble with the cores, we would be tempted to try one made of materials employed in investment molding. Such cores would be extremely rigid, and probably would have to be removed by immersing the casting in molten caustic soda.

You might try a refractory mix composed of 34.6 parts by weight of silica flour, 45 parts 140-mesh silica sand, 20 parts 60-mesh silica sand and 0.4 part magnesium oxide. The stock binder is formed of 15 volumes of condensed ethyl silicate which is stirred into a mixture of 8 volumes of denatured alcohol and 2 volumes of 1 per cent hydrochloric acid. The combined mixture should be allowed to stand at least 2 hours before use. Just prior to use, water is added to the stock silicate solution in the ratio of 6.5 volumes of water to 100 volumes of silicate.

To form the core, 3.4 oz of the diluted solution is added to 1 lb of the refractory. This core mix is in the form of a slurry, which preferably is vibrated into a well-greased corebox. Plaster should serve admirably for the box. The material should harden sufficiently to handle in 1½ to 2 hours. The core then is removed from the box, ignited to burn off the excess alcohol, and baked at around 1400° F.

A cast-weld fabrication method might eliminate use of cores or hold them to the minimum. In this practice one shroud or flange is cast complete with vanes and hub. The other shroud is cast with holes to fit the hub and vanes. The two sections are fitted together and welded. A number of variations of the procedure are possible to satisfy the individual part and cost and hold welding to the minimum.



Gating into hub and vertical pouring recommended for impeller

Liners Centrifugally Cast

In our foundry in South America we are trying to make 3½-in.-diam cylinder liners, using an iron containing 3.30 per cent TC, 2 per cent Si, 0.40 per cent Mn, 0.13 per cent S, and 0.15 per cent P. Iron temperature is 2200° F, and the steel molds are water cooled to 200° F. Rotation is 800 rpm.

The liners from the mold have a wrinkled outside surface, and the latter is very hard. Also, machining shows up small holes. The mold vibrates during operation, and the iron in the liners appears stratified. We use cast iron funnels but the iron sticks to them. How should the liners be heat treated to produce a Brinell hardness of 220 to 240?

It is our opinion that the wrinkled surface and porosity in your liners result from low pouring temperature of the iron and a cold mold. Also, the iron may be poured too slowly into the mold. According to our calculations the pouring tem-

perature you mention is only about 65° above the liquidus, and possibly the temperature measuring instrument may be faulty.

We suggest a pouring temperature around 2600° F and a mold temperature from 700 to 900° F. Molds and pouring cups or funnels should be coated prior to use with a thin protective film made of silica flour with a small amount of clay or bentonite for bonding, and with or without a small amount of sodium silicate as a suspension agent. The wash is applied while the mold is around 200° F so that it will dry rapidly but not boil.

Your spinnnig speed is rather low for the diameter of the liner mentioned; we suggest increasing the speed to about 1100 rpm, which will provide a gravitational force of about 60 times gravity. Before doing so, study your equipment and try to reduce the vibration to a minimum. Vibration is the cause of the stratification you mention and is a safety hazard.

The iron should be poured into the mold as quickly as possible, and the usual practice is to employ a suitable cup mounted on trunnions in front of the mold and over a spout which extends into the mold for a short distance. The cup should hold just the proper amount of iron to produce a liner with the desired wall thickness. All the operator has to do is to empty the metal from the cup into the spout. Coating the cup and spout with a refractory wash should prevent sticking.

Use of the refractory wash on the mold also should prevent chilling of the exterior surface of the liners, and by co-ordination of such factors as iron composition, pouring and mold temperatures, and length of spinning time it is possible to produce liners within the desired hardness range without heat treatment.

Since plain gray irons do not lend themselves well to heat treatment, owing to rapid changes in structure in the usual transformation ranges, alloy additions generally are made to reduce the speed of the changes. In your case you might try heating to 1500° F, quenching in oil, and drawing or tempering at 1100° F. Arbors should be used to prevent distortion of the liners. If the castings are too hard, increase the drawing temperature; if too soft, decrease the temperature.

Has Trouble with Sprocket

We are having difficulty in producing some sprocket gear blanks about 11½ in. in diam with a hub 3½ in. in diam and 2½ in. thick. Sprocket rim is ⅝ in. thick and connected to the hub with a web about 5/16 in. thick at the rim and about 9/16 in. thick at the hub. Web contains six holes about 1½ in. in diam.

When we pour with cold iron and gate from the rim, we get blowholes in the hub and smaller ones on the rim. Hub blows are deep but smooth. When we pour with hot iron, we have a shrink hole on the side of the hub. When we put a riser on top of the hub, we have a shrink hole under the riser. We have used two extra risers on the outside of the rim, but either have shrinks in the hub with hot iron or blowholes with cold iron even though we wire-vent the mold liberally.

Your difficulty is due to the method of gating. Unless cooling and other conditions are exceedingly favorable, it is practically impossible to feed successfully a heavy section through a thin member since the latter freezes off or solidifies too soon, leaving the heavy section without a source of molten metal to feed it. One exception might be the use of exothermic molding material surrounding the thin section; this would delay freezing for a sufficient period.

Although you mention use of a riser over the hub, it will not function for either or both of two reasons. One is that the size may not be sufficient, and the other is that the iron in the riser is not hot enough to do any feeding. It is quite possible that a solid hub could be obtained with rim gating if hot metal were poured into the riser as soon as the iron level in the cavity reaches the top of the hub.

We think, however, that it will be more satisfactory to pour directly into the hub by using a thin cut-off or strainer core about ¼ in. thick made of a fairly strong oil-sand mix. The core contains three ⅜-in.-diam holes spaced equidistantly on a circle midway between the inside and outside diameters of the hub. Diameter of the cut-off core is the same as that of the hub, and the core is placed at the junction of hub and riser. The latter is formed by placing a plug on the hub.

The plug is turned the same diameter as the hub for ¼ in. and the remainder is 3¼ in. in diam. That will form a recess in the cope at the top of the hub to receive the cut-off core. The core is held in place by insertion of a few nails.

Castings Contain Blowholes

We are forwarding a cast iron bearing cap containing blowholes on the drag side. Castings are made on a jolt-squeeze machine, and we have been having similar trouble with small heavy-sectioned castings. We do not experience any trouble on castings made on the sand-slinger.

Iron contains 2.0 to 2.1 per cent Si and 3.40 per cent TC, and spout temperature of the iron is around 2800° F. Sand used consists of silica sand with an AFS grain fineness number of 63, bonded with a mixture of southern and western bentonites, and containing seacoal, wood flour, and a small amount of corn flour. Moisture runs 3.5 to 4.0 per cent, permeability about 100, and green compression strength 12.5 to 14.0 psi.

The defect appears periodically, and we have tried to reproduce it by hard ramming, wet sand, cold iron, etc., without success.

Cause of the small holes in the casting apparently is gassy iron since fracturing showed the presence of the elongated or pear-shape holes just under the skin in other areas. Interior of the holes is bright and shiny. With the cause determined, the next thing is to find the source of the gassy condition, and that is not so easy.

Gas may develop from improperly dried ladles or cupola spout, or perhaps from the bed burning away. Often gassy metal originates from the common but careless practice of repairing the lip of the pouring ladle with damp mud and not permitting it to dry before molten metal is poured over it. Steam generated by the first metal over the lip is picked up by the stream and carried into the casting.

Often in the case of castings with thin sections, solidification occurs so rapidly that the gas in the metal is held in suspension in a finely divided state and so well distributed that it does not show up except under high magnification. In medium heavy sections the gas tends to collect in bubbles and tries to escape

if you didn't see it at the Show, here's . . . .

F.E.'s FULLY AUTOMATIC SHELL CORE BLOWER

POWER CONSUMPTION: 20"x16" heater plate, 16½ KW — 20"x24" plate, 24 KW.

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OVER-ALL BLOWER DIMENSIONS: Length 80", width 52", height 50".

F. E.'s new, streamlined Shell Core Blower uses two standard size, interchangeable heater plates — 20"x16" for core box sizes up to 20"x17"x14", and 20"x24" for boxes to 20"x25"x14".

All movements hydraulically controlled. Hydraulic unit and electric control panel self-contained, placed for convenience. Cores are ejected by means of a "flip-plate" assembly, which virtually "hands" cores to the operator. At no time does the operator have his hands between the heater plates.

F. E.'s Shell Core Blower is fast, efficient and very easy to operate. Turns out perfect shell cores — no core breakage, no core box wear. Quickly changed from fully-automatic to single cycle control. Easily set up and economical to operate.

Additional information and prices on request.

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Circle 629 on Page 53

to the surface, but is caught under the skin. In heavy sections the metal remains in a liquid condition longer and often permits the gas to escape through it.

Bentonite Properties Differ

Can you tell us the difference between southern and western bentonite? Can southern bentonite be used successfully in sands for steel castings, and if so should we use the same amount of southern as now used with western bentonite?

Southern and western bentonites differ in several characteristics in addition to differences in sodium and calcium contents. Southern bentonite is the calcium type containing about 1.50 per cent lime and 0.20 per cent soda, and western bentonite is the sodium type containing about 2.60 per cent soda and 0.50 per cent lime.

Western bentonite thickens with addition of water and forms suspendible gels but southern bentonite does not. Western bentonite as a sand bonding agent provides high hot and dry strength which results in resistance to cutting and washing. It also is a durable bond. Southern bentonite is somewhat lower in dry strength and considerably lower in hot strength than western bentonite, and, due to those characteristics, not as durable as the western-type.

Because of the relatively low hot strength of southern bentonite, it is not used to any great extent in producing steel castings. It has been reported, however, that additions of about 25 per cent of southern bentonite to western bentonite have been employed to obtain better collapsibility and easier shakeout of the mold and less cleaning required on the castings.

Has Problem in Coremaking

We make cores with conventional oil-base materials, also by the CO_2 process and the shell process, and two of our coremakers have contracted dermatitis. We suspect that the trouble is caused by the resin used in the shell cores, but have not been able to prove it or prevent recurrence of the dermatitis. Any advice or suggestions will be appreciated. We know this is not a local problem, but our suppliers have not been able to provide a solution.

Trouble with dermatitis in the shell molding and resin-bonded core processes apparently is of a minor nature. Search of the literature indicates that some individuals become sensitized to phenolic resins and afflicted with dermatitis. The only apparent remedy is to move such individuals to some other work area.

Indications are that the dermatitis results from contact of the resins with the skin, and recommendations are to mix the resin and sand in closed containers with a small amount of dust suppressor such as kerosene, to prevent emergence of fine resin dust into the atmosphere. The area in which the sand-resin mixture is used should be well ventilated for the same purpose. Thorough washing of the skin area exposed to resin dust is essential.

While it may be as you indicate that the resin is responsible for the dermatitis, there is a possibility that the sodium silicate binder used in the CO_2 process is a source. As you undoubtedly know, sodium silicate is an alkali which may remove oil from the skin and give rise to a type of dermatitis.

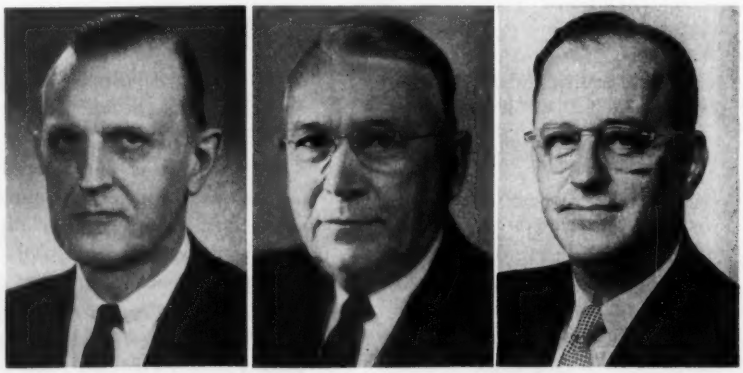
Foundry Editorial Staff Changes Made

William G. Gude, since 1946 managing editor of FOUNDRY, has been appointed editor. He succeeds Frank G. Steinebach, who assumes the new position of publisher and editorial director. George A. Pope continues as business manager.

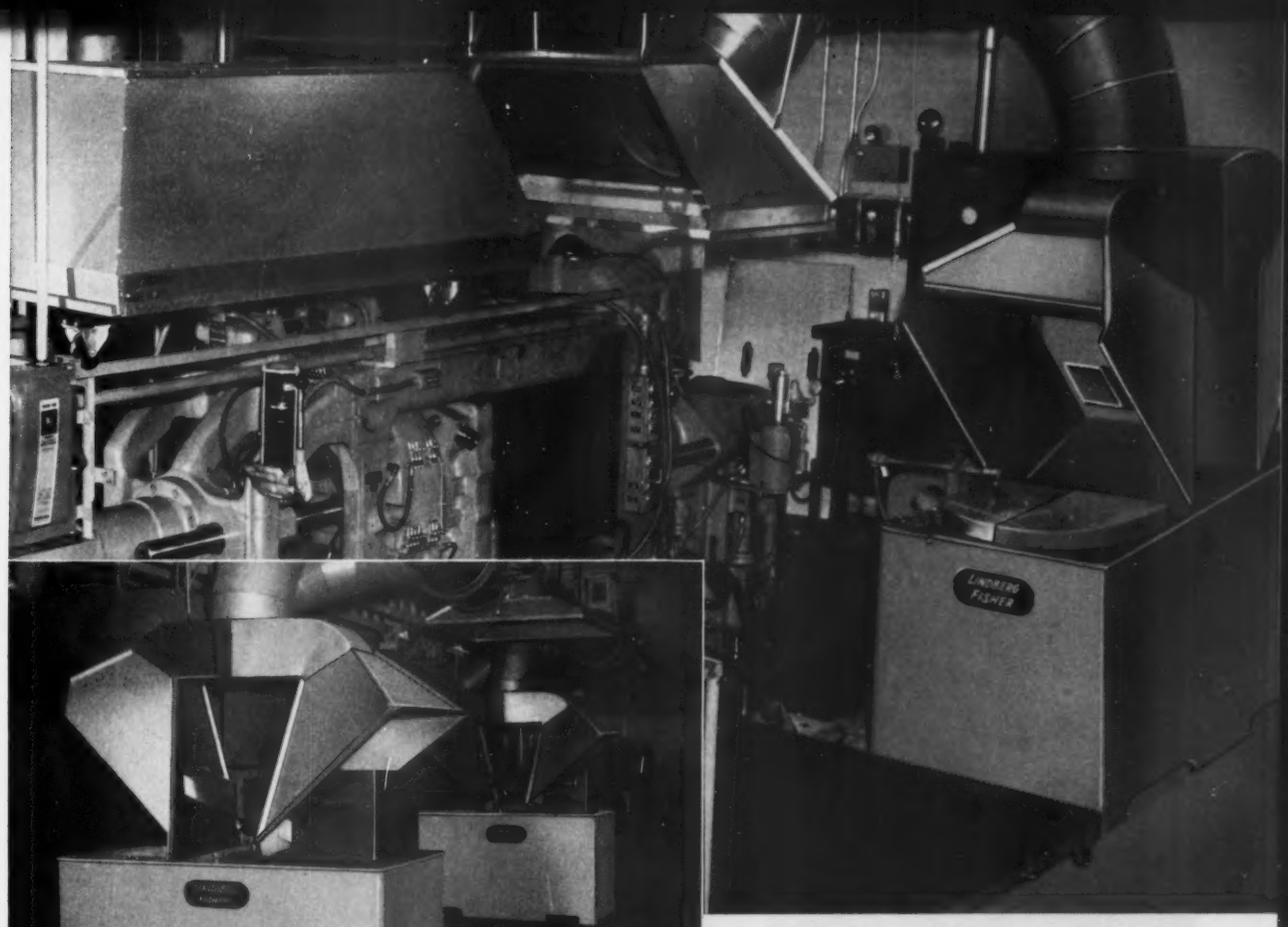
Mr. Gude was graduated from Purdue University in 1925 and joined the Penton Publishing Co. the following year. After serving as editorial representative for the company's various publications in the Pittsburgh, Chicago, and New York offices, he joined the FOUNDRY staff in Cleveland in 1943 as associate editor. Chairman of the Northeastern Ohio Chapter of AFS in 1949-50, he is also a past secretary of the Chicago Chapter.

Mr. Steinebach joined the Penton company shortly after graduation from Purdue University in 1922. He became a member of the FOUNDRY editorial staff in 1924, was made associate editor in 1926, managing editor in 1929, and editor in 1936. He has been secretary of the company since 1937 and was elected a vice president in 1944. Mr. Steinebach was Northeastern Ohio Chapter chairman in 1936-37; he received the John A. Penton Medal of AFS in 1952, and the Gray Iron Founders' Society's Gold Medal in 1953. He is secretary of the National Castings Council and immediate past president of the Foundry Educational Foundation.

Mr. Pope joined the business department of FOUNDRY in 1930. In 1940 he was named district manager at Chicago, and for the last ten years has served as business manager with headquarters in Cleveland.



WILLIAM G. GUDE *FRANK G. STEINEBACH* *GEORGE A. POPE*



Lindberg Melting and Holding Furnaces at Electrolux Corporation, Old Greenwich, Conn., are conveniently spotted adjacent to die casting machines. Special furnace hoods remove accumulated gases.

Lindberg battery at Electrolux. These 80 KW two-chamber induction furnaces melt and hold aluminum for die casting Electrolux Vacuum Cleaner parts. Note convenient chute to return gates and risers to melting chamber with splash shield.

LINDBERG MELT AND HOLD FURNACES HELP DIE CASTING EFFICIENCY AT ELECTROLUX

Recently, Electrolux Corporation, Old Greenwich, Conn., decided to die cast parts for the famous Electrolux Vacuum Cleaner in their own plant. To insure greatest efficiency and to provide the most ideal layout and working conditions Lindberg Two-Chamber Induction Melting and Holding Furnaces were selected to supply aluminum for the die casting machines. Electrolux has found Lindberg equipment to be completely reliable, ideal casting temperatures are easily maintained and the absence of noise and burner heat assures comfortable clean working areas. Operation has proved so satisfactory that two additional Lindberg furnaces have been purchased and are now being installed.

Wherever or however aluminum needs heat there is Lindberg equipment to apply it most economically and efficiently. Furnaces for melting and holding, casting stations, remelting or heat treating are available in all capacities, electric or fuel fired. See your Lindberg Field Representative (consult your classified phone directory) or write us direct. Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Ave., Downey, Calif. In Canada: Birlefco-Lindberg, Ltd., Toronto. *Also factories in:* Argentina, Australia, England, France, Germany, Italy, Japan, Scotland, South Africa, Spain and Switzerland.

Circle 630 on Page 53

LINDBERG heat for industry

Can you store cores in stacks like this?

You can if they're *shell cores.*

That's only *one* of the bonus features shell coring gave Buffalo Pipe and Foundry Company. Others:

Fourteen men turn out 4,000 soil pipe fittings daily . . . in 225 different designs. Previously it would have required fifty men to produce the same quantity. These castings are better, too. Weight can be controlled better. Harder, smoother core surfaces give the fittings a better internal surface. There's less scrap.

Much of the credit goes to Milton Emery, the foundry's production manager, who could see the real advantages of shell cores. Working closely with the Durez technical staff, Mr. Emery was able to perfect his process, using a Durez liquid resin.

If you'd like to enjoy the many advantages of shell cores, get in touch with Durez at 1006 Walck Road, North Tonawanda, N. Y.

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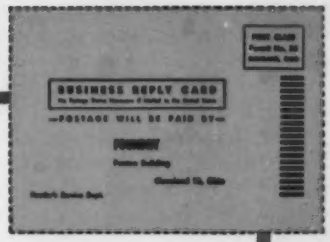
HOOKER CHEMICAL CORPORATION, 1006 WALCK RD., NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Circle 631 on Page 53

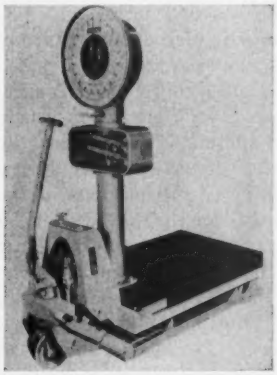
For More Information
Use Reply Card—Page 53



What's New in Equipment and Supplies

PORTABLE SCALE TRUCK

Scale is incorporated as an integral part of a hydraulic footlift truck to eliminate multiple handling of loads. The portable scale truck is

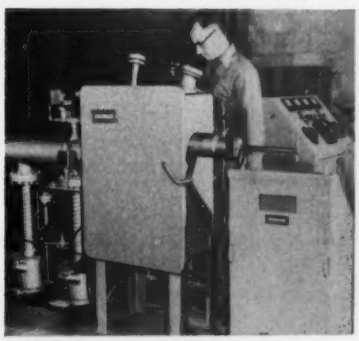


built with special lifting angles to hold the scale. Each truck must be adapted to design and capacity of the scale used.—**Lewis-Shepard Products Inc.**, Dept. R10-3, 125 Walnut St., Watertown 72, Mass.

For More Details Circle No. 460—Page 53

VACUUM FURNACE

Vacuum melting and casting furnace shown is Model 437-520. Unit has a crucible with melting capacity



of 17 lb (steel measure) and can handle molds up to 15 in. high by 10 in. in diam. The compact furnace is designed for production of investment castings.—**F. J. Stokes Corp.**, 5500 Tabor Rd., Philadelphia 20, Pa.

For More Details Circle No. 461—Page 53

ATMOSPHERE ANALYZER

Furnace atmosphere analyzer provides completely automatic analysis of components in atmosphere. Unit performs 4-component analytical cycle every ten minutes. In operation, sample gas is drawn from

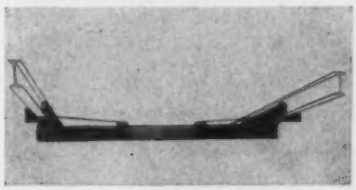
the furnace by a vacuum pump, filtered, and introduced into the analyzer at a carefully regulated flow. Sensing unit separates the sample into its individual components by chromatographic techniques. Components are measured by a highly accurate thermistor detector and relayed to a recorder.

The analyzer consists of a sensing unit assembly enclosed in an explosion-resistant housing, a programmer with hermetically sealed switches enclosed in a purgeable case, and a recorder. Instrument requires a sample tap and a 600-w, 115-v electrical connection.—**Perkin-Elmer Corp.**, Main Avenue, Norwalk, Conn.

For More Details Circle No. 462—Page 53

PACKAGED CRANES

Packaged cranes are inexpensive and can be installed quickly without drilling or welding with the addition



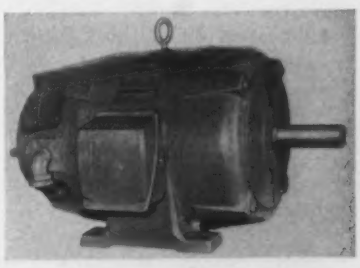
of an I-beam and driveshaft. Offered in top running or underhung models up to 5-ton capacity, the cranes save on freight costs and are adaptable to different spans and sizes of rails and beams.

Crane is shipped complete with assembled end trucks and all other parts except the I-beam and driveshaft. Only wrenches are required for assembly. — **Harrington Co.**, Plymouth Meeting, Pa.

For More Details Circle No. 463—Page 53

WOUND ROTOR MOTOR

Life-Line "A" wound rotor induction motors are designed for adjustable or constant speed drives



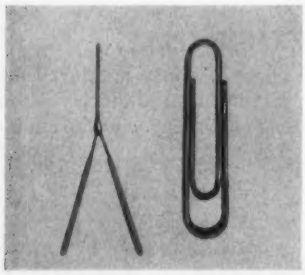
which require high-starting torque with low-starting current. Motors are available in all standard ratings in frame sizes 254 to 326, representing 2 to 30 hp up to 1800 rpm.

Other features include sealed-for-life, lubricated ball bearings; Class B insulation system; diagonally split conduit box to provide flexibility and ease of installation; and brushholders placed for maximum access through extra-large hand holes. Spring and lever arrangement eliminates need for pressure adjustments during brush life.—**Westinghouse Electric Corp.**, P. O. Box 2099, Pittsburgh 30, Pa.

For More Details Circle No. 464—Page 53

STRAIN GAGE

Mono-Filament strain gage is a tiny wire device suited for use in-



side components and tight spots. Unit consists of a single, straight, strain-sensitive element, with suitable leads attached, coated with an electrically insulating cement. Total diameter is less than 0.012 in. Coating permits use of noninsulating cements and cements which cure at low temperatures. Device comes in various materials, configurations, and electrical resistances for different purposes.—**High Temperature Instruments Corp.**, Bala-Cynwyd, Pa.

For More Details Circle No. 465—Page 53

PROTECTIVE PADS

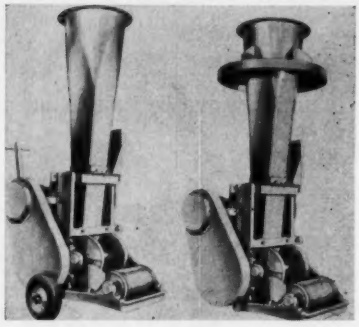
Sela pads are for use on wire rope slings when lifting machines and parts. Pads are mounted on the rope and can be slid by hand along the rope to those points where the sliding wire rope would scratch or damage the load. Made of aluminum alloy with a rubber lining facing the surface of the load, the pads are offered in five sizes.—**Columbia Technical Corp.**, 61-02 31st Ave., Woodside 77, N. Y.

For More Details Circle No. 466—Page 53

BULK MATERIAL HURLERS

Jetslinger machines hurl free-flowing bulk materials into areas usually inaccessible by other mechanical means. Units can load boxcars and trucks or stockpile material in warehouses. Three models are available. A suspended, swiveling model is shown at the right in the illustration. Two portable, wheel-mounted models also are offered, one of which is shown at left.

Machines come in belt widths of 14, 20, and 28 in., have capacities



up to 700 tph for materials weighing 50 lb per cu ft, and can hurl materials as far as 90 ft and pile it up to 35 ft high above the discharge point.—**Link-Belt Co.**, Dept. PR, Prudential Plaza, Chicago 1, Ill.

For More Details Circle No. 467—Page 53

MOLD COATINGS

Two coatings provide protection for molds and cores. Hytemp is an inexpensive versatile coating for sand cores and molds which must withstand high pouring temperatures as encountered with steel, cast iron, and bronze. The coating is intended for high-speed repetitive and automatic operations. Being volatile, it is easily ignited and therefore can reduce time normally required for heavy torching. Hytemp is said to be an ideal carrier for refractory facings such as zircon. The resins reportedly penetrate pores on mold surfaces.

Plaster Prime is a surface sealer and coating for plaster molds. The material is said to provide abrasion resistance and moisture proofing and to reduce normal drying or baking time. The coating can be applied as soon as the plaster slurry sets, or when the mold or form has been allowed to dry.—**Para Products Div., Foundry Rubber Inc.**, 5200 River Rd., Washington 16, D. C.

For More Details Circle No. 468—Page 53

DATA COLLECTING SYSTEM

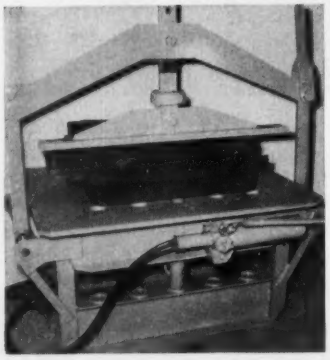
Collectadata is a general name for a system of readers and punches designed to collect data from several points of origin in a central processing unit. Transmitters are connected to a single receiver where work information is read automatically and transmitted numerically to punched tape or edge-punched, tab, and form cards. System helps to achieve accurate and current control of work areas from management positions, decreases handwritten re-

Flask Service Unit Reconditions Steel Flasks

Flask service unit is designed for checking, repair, reshaping, and adjustment of steel foundry flasks. Set up in the molding area, it can be used to adjust and reset pin centers, press out and replace worn pins and bushings, square up sprung flasks, straighten up sand joints, and straighten bent sides and ends.

Units are available for flasks up to 20 x 30 in.; 26 x 42 in.; 34 x 54 in.; and 44 x 66 in. Special units also are available for larger sizes.

A series of machined holes for checking pin centers are drilled to suit individual flask standards, and clearance height for



flask clamp is adjustable for any depth of flask section.—**Beloit Products Co.**, P. O. Box 994, Beloit, Wis.

For More Details Circle No. 501—Page 53

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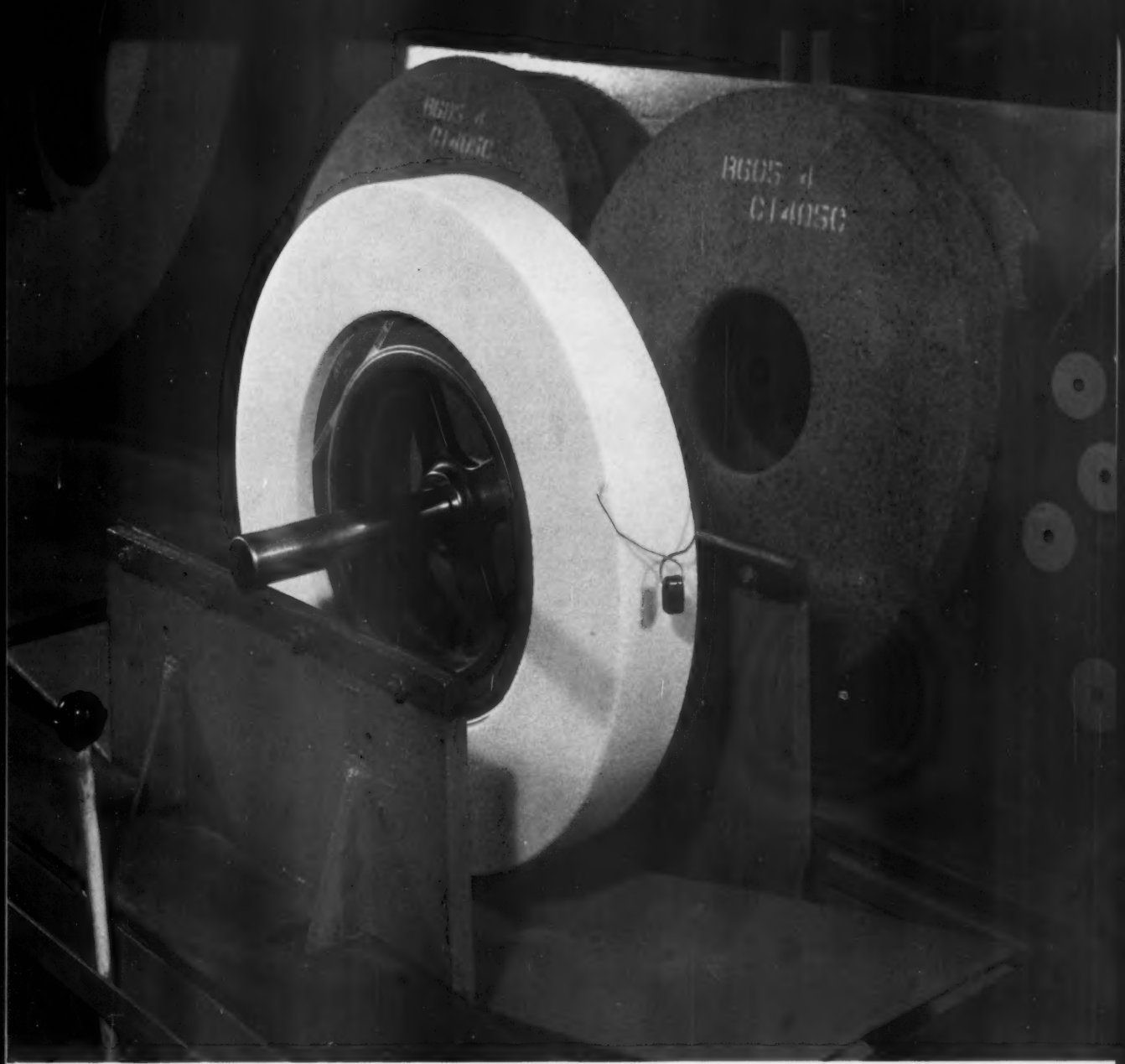

Balanced to a thousandth

Every Peninsular wheel must pass the most rigid test for balance to insure freedom from vibration and smooth operation. Out-of-balance allowance may be less than 1/1000th of wheel weight, as little as one gram—depending on recommended wheel application.

When you add to this our highly effective methods of assuring uniform density, you can be sure that any Peninsular wheel—vitrified or resinoid—will do its job smoothly and efficiently.

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Interested in regularity of your melting operation?

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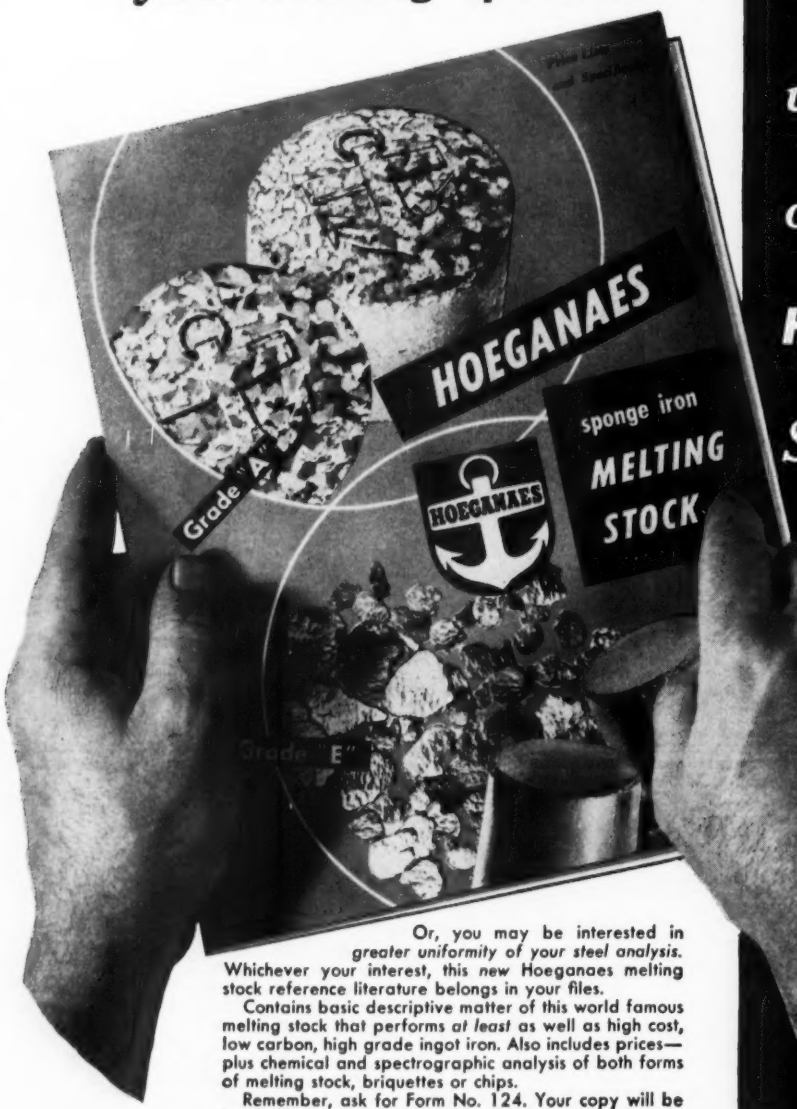

Or, you may be interested in *greater uniformity of your steel analysis.* Whichever your interest, this *new* Hoeganaes melting stock reference literature belongs in your files.

Contains basic descriptive matter of this world famous melting stock that performs *at least* as well as high cost, low carbon, high grade ingot iron. Also includes prices—plus chemical and spectrographic analysis of both forms of melting stock, briquettes or chips.

Remember, ask for Form No. 124. Your copy will be in the return mail.

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RIVERTON, NEW JERSEY

SALES REPRESENTATIVES IN PRINCIPAL CITIES: Birmingham, Chicago, Cincinnati, Cleveland (Fostoria), Edmonton (Alberta, Canada), Montreal (Canada), Toronto (Canada), Los Angeles, Mexico 16, D. F. (Mexico), Minneapolis, New England (Elmira, N. Y.), Odessa (Texas), Philadelphia (Riverton, N. J.), Pittsburgh, San Francisco, St. Louis

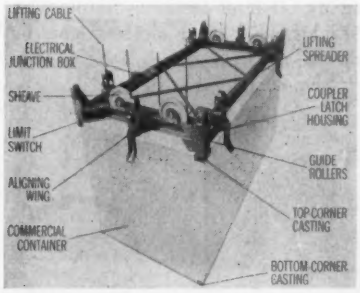
Circle 633 on Page 53

ports, and aids in billing, inventory control, and production time recording.—**Friden Inc.**, 1 Leighton Ave., Rochester 2, N. Y.

For More Details Circle No. 469—Page 53

CONTAINER HANDLING SYSTEM

Speedloader System of handling containers offers standardization for marine, land, and air-transported cargoes. The automatic system is adaptable to any commercial



container, crane, or vehicle. Illustration shows major components of the system.

Components include top and bottom corner castings to attach to the structure of the container; a crane lifting spreader with coupler latches, wired for an electrical safety interlock system; aligning wings; and lifting cable sheaves. Holes in top-corner castings permit hook-hoisting.—**National Malleable & Steel Castings Co., Transportation Products Div.**, 10590 Quincy Ave., Cleveland 6, Ohio.

For More Details Circle No. 470—Page 53

IMMERSION THERMOCOUPLE

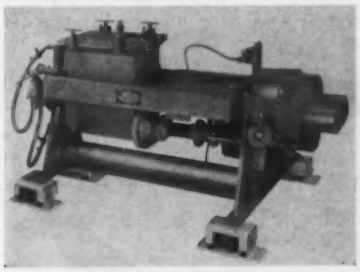
Expandable immersion thermocouple is primarily for measuring steel temperatures in both open-hearth and electric furnaces, but can be used with other molten metals as well. Ceramic base serves as a mounting for noble metal thermocouple wires. A transparent fused silica tube, firmly anchored, protects the wires and is shielded from slag and floating solids by a metal cap. The cap absorbs the physical shock of immersion and melts away after plunging beneath the slag.

Unit can be assembled without alignment of contact pins. Two different thermocouple combinations are available, either platinum vs. platinum 10 per cent rhodium or platinum vs. platinum 13 per cent rhodium. — **Engelhard Industries Inc.**, Advertising Dept., 113 Astor St., Newark, N. J.

For More Details Circle No. 471—Page 53

FINISHING VIBRATOR

Model 1016E, 3-hp vibrator for precision finishing, is of heavy-duty welded steel construction. Features include a rubber-lined bowl mounted on special coil and leaf springs and built-in tachometer to



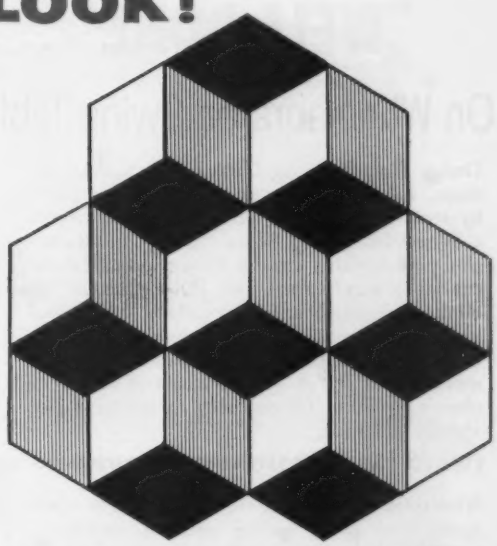
permit direct reading of frequency. Drive speed is variable continuously over a wide range. Vibration is achieved through use of an eccentric shaft. Frequency and ampli-

EXECUTIVE REPORT #17

TAKE A SECOND LOOK!

Are you getting FULL Value for your Abrasive Dollar?

Count the cubes in the figure. You'll see six or seven, depending upon your point of view. Consider the total value of your present abrasive, and compare it with the proven value of Wheelabrator Steel Shot. Not just in price, but in abrasive consumption, cleaning speed, cleaning quality, and equipment maintenance costs as well. From any point of view, the proven quality of Wheelabrator Steel Shot adds up to extra value and extra profit.



Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

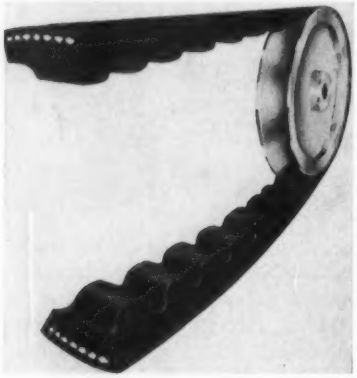
tude of the vibration can be varied.

Mechanism allows compensation for large variations in the weight of the load. Bowl is tilted by a pneumatic system controlled by a hand-operated valve. System is lubricated automatically. — **Lord Chemical Corp.**, 2068 S. Queen St., York, Pa.

For More Details Circle No. 472—Page 53

NOTCHED V-BELT

CX notched V-belt with fully molded and fully jacketed construction is said to eliminate flex-cracking and increase fatigue resistance. It is claimed to be quiet, vibrationless, and long-wearing. High tensile-strength members are micropositioned and formed into an arch through a patented molding process, reportedly resulting in little or no slippage and in uniform pitch. Unit is available to original equipment manufacturers. — **Raybestos-Manhattan Inc., Manhattan Rubber Div.**, Passaic, N. J.



For More Details Circle No. 473—Page 53

RAMMERS

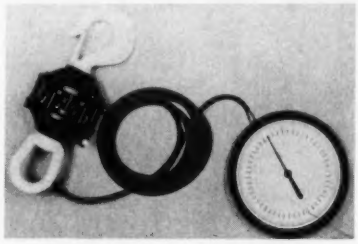
Three floor type rammers, called Sand Wiper rammers, are designed to cut molding cost. The air-powered rammers have a front seal of neoprene-felt which wipes the surface of a chrome-plated piston rod clean. This action prevents entrance of sand or abrasive material into the bore of the guide or the barrel.

Leather seal ring provides an airtight seal around the piston rod, reducing friction. Air pressure against the face of the seal holds it in place. Unit is self-adjusting to compensate for wear and keep power and speed at a maximum. Floor molding models are 50⅞ and 52¾ in. long. Bench models are 23¼ and 25½ in. long. Weights range from 18 to 47⅛ lb. — **Ingersoll-Rand Co.**, 11 Broadway, New York 4, N. Y.

For More Details Circle No. 474—Page 53

CRANE SCALE

The load element and the indicator of an overhead crane scale are provided as separate units connected by 50 ft of flexible, double-wire braid hose. Load element can be picked up by a crane hook to any reasonable height and the indicator can be mounted at eye level. The element provides for automatic self-alignment under tension. It has 360-degree calibration, with 25 per



EXECUTIVE REPORT #20

CASTINGS SERVED "WELL DONE"

On Wheelabrator® Swing Table®

Dodge Manufacturing Corp. of Mishawaka, Indiana, turned a production problem into profit by replacing outgrown airblast equipment with a Wheelabrator 96" Swing Table. The production power of this versatile blast cleaning cabinet cut labor requirements one third, and entirely eliminated overtime. Easy overhead loading and unloading speeds production, makes work handling highly efficient. The giant table takes mixed loads up to 10,000 lbs., and serves up cleaning quality far superior to anything previously obtained.

SWING TABLE OPTIONS COMPOUND ITS VERSATILITY

Wheelabrator Swing Tables can be equipped with double work doors, loading vestibules, spotblasting facilities, and other versatile features. For details, see your Wheelabrator engineer or write to Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

cent tare adjustment, on a 12-in. dial. Dial pointer can travel an overload margin of 90 degrees.

Unit meets Bureau of Standards accuracy specifications, and is calibrated and sealed at the factory. System is available in capacities from 1000 to 60,000 lb.—**Martin-Decker Corp.**, 3431 Cherry Ave., Long Beach 7, Calif.

For More Details Circle No. 475—Page 53

INSULATOR

Usite is an insulator for maintaining the temperature of metal in hot tops, risers, and transfer ladles. Material is a fine powder, free of graphite, and is chemically inert. Usite is said to prevent formation of secondary pipe, and to promote formation of flat shrinkage in the head.—**Barium & Chemicals Inc.**, 4043 Erie, Willoughby, Ohio.

For More Details Circle No. 476—Page 53

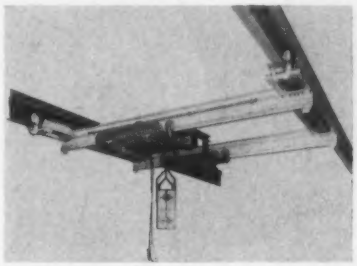
WORK GLOVE AUTOMAT

Work glove automat dispenses work gloves to employees. The unit is a wall hung steel cabinet operating on special alloy metal tokens to deliver any type of glove. Automat can be adapted to any existing glove program. Features include a sensitive slug rejector and a nonreset counter.—**Arlington Industries Inc.**, 1513 N. Shore Rd., Revere 51, Mass.

For More Details Circle No. 477—Page 53

HOIST CARRIER

To solve headroom problems, hoists can be bracketed in a special carrier between two crane bridges



with the bridges also mounted between the two craneways. This system raises the hoist hook to the same level as the bottom flange of the bridges, and headroom dimensions are held to a minimum of less than 2 ft, depending on the span and capacity of the hoist. Longer crane spans also can be used. Drive units are available with hand chain or electric power.—**American Mono-Rail Co.**, 1111 E. 200th St., Cleveland 17, Ohio.

For More Details Circle No. 478—Page 53

MARKING HOLDER

Flexaligner, hammer-style holder for marking with steel character dies, features self-alignment which compensates for slope or irregularities of the marking surface, for tilted holder positioning, and for glancing of the striking hammer. Holder is provided with Roto-Lok which is rotated 180 degrees to lock in place the number or letter dies or release them for changing.—**Pannier Corp.**, 602 Pannier Bldg., Pittsburgh 12, Pa.

For More Details Circle No. 479—Page 53

GOUGING TORCH

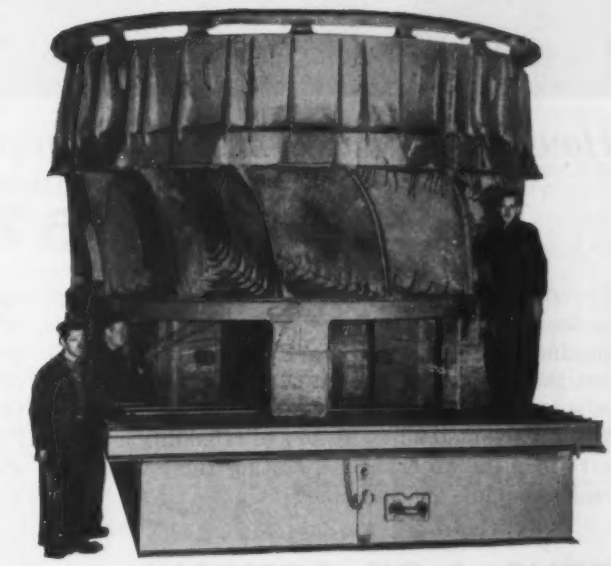
Heavy-duty manual gouging torch Model H-6 is available for work requiring large electrodes—⅝ and ¾ in.—for fast removal of

EXECUTIVE REPORT #21

THEY SAID "IT COULDN'T BE DONE"

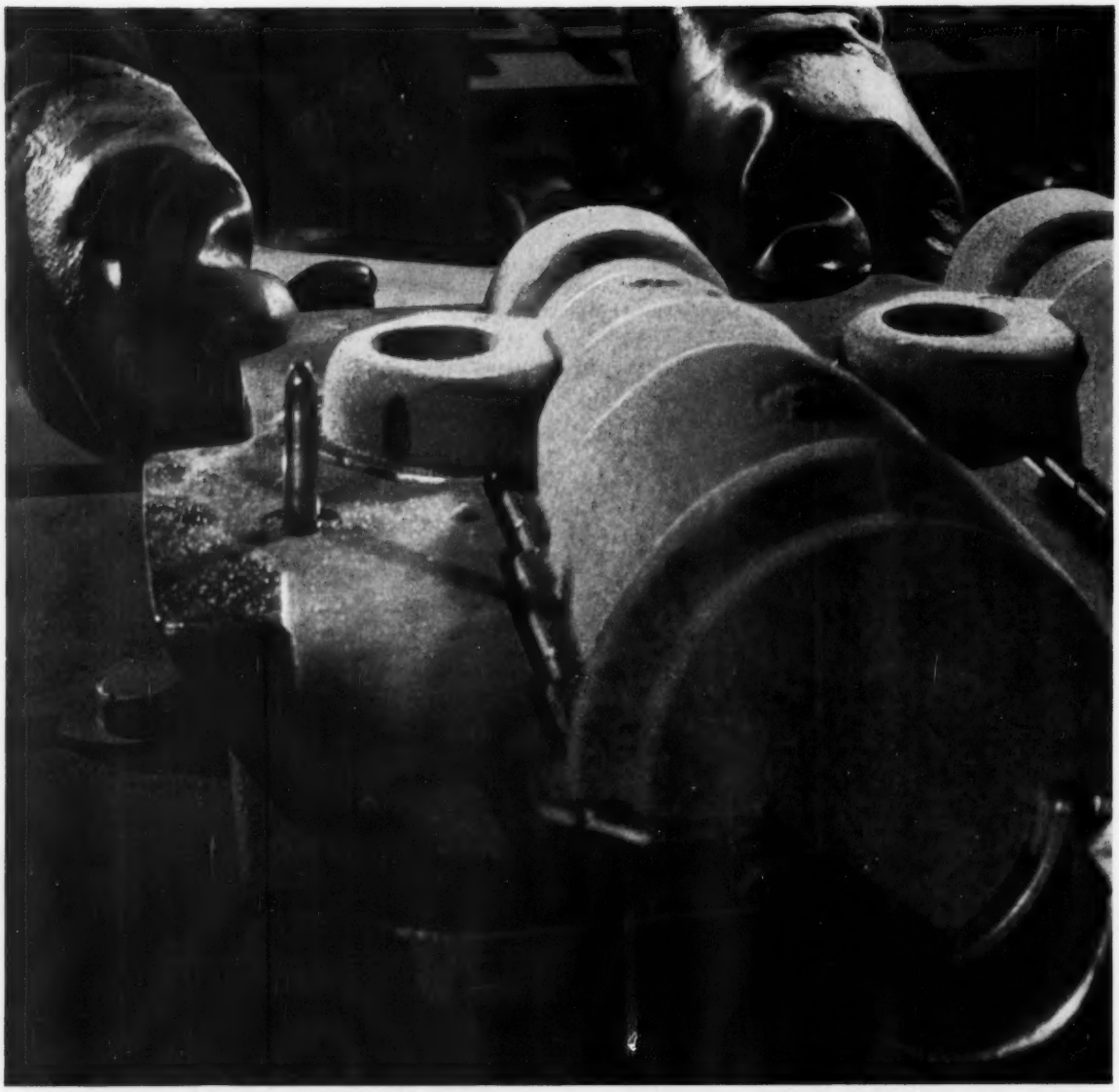
but Wheelabrator® cleaned this 100-ton casting in 20 minutes

The enormity of a casting like this would have made it one of those "impossible" cleaning jobs by manual airblasting. But a Wheelabrator Car-Type Room equipped with 8 blasting wheels takes it in stride at Canadian Steel Foundries, Ltd. Here, castings measuring 20 ft. in diameter and over 12 ft. in height are cleaned thoroughly in blast cycles of only 15 to 20 minutes in the automated Wheelabrator room.



Wheelabrator engineers, leading in experience in designing machines for special applications, have developed a line of blast rooms employing unique work-handling methods suited to varied requirements. For illustrated examples, ask for Catalog 142-D. Wheelabrator Corp, 505 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT



How to economize without a compromise...

PENOLYN 167 CORE OIL

Foundrymen know that when the castings they produce are costly, complex, and subject to rigid specifications...they shouldn't settle for anything less than Penolyn 167 Core Oil. Consistently used in some of the nation's leading foundries, Penolyn 167 has an outstanding history of reliability and is sure to make an expensive casting right when it really counts – *the first time.*

As a leading producer and nation-wide marketer of core oils for 30 years, Penola is quite proud of its position as a leader in the development of new, efficient, dependable core oils. For further information, contact your nearest Penola office or write: Penola Oil Company, 15 West 51st Street, New York 19, New York.

Penola

PENOLA OIL COMPANY NEW YORK · DETROIT · CHICAGO

QUALITY · RELIABILITY · FAST DELIVERY · TECHNICAL ASSISTANCE

large areas of metal. One of the primary purposes of the torch is casting conditioning in foundry cleaning rooms. Forward section of the torch handle and a positionable head both have a protective sleeve of silicone glass laminate. Rubber boot provides a safety cover for the electrical connection on the end of the torch's concentric cable.—**Arcair Co.**, P. O. Box 431, Lancaster, Ohio.

For More Details Circle No. 480—Page 53

MACHINE MOUNTING

UL Unisorb Level-Rite machine mount is for use under machines with leveling screws built into the feet or at load bearing points. Vibration control pads are combined with a cast steel base plate, which has a recessed center to accept the external leveling screw. Sizes range from 4⅝ to 10⅝-in. square with maximum loadings per unit up to 7500 lb.—**Unisorb Div., Felters Co.**, 210 South St., Boston 11, Mass.

For More Details Circle No. 481—Page 53

SAFETY SHOE GUARD

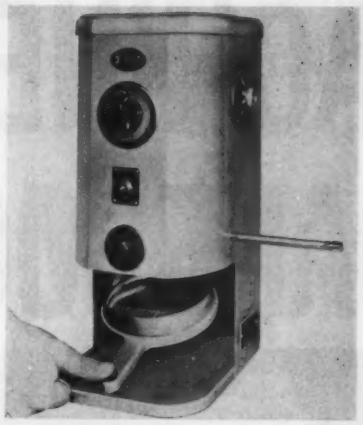
Alpenco Metagard is designed to supplement protection provided by steel toe safety shoes. The guard attaches through the laces of a shoe and fits both high and low shoes in all sizes. Metagard is made of

stainless steel. It is lightweight and padded with a heavy cushion of closed cell neoprene sponge.—**Albert W. Pendergast Safety Equipment Co.**, Tulip and Longshore Streets, Philadelphia 35, Pa.

For More Details Circle No. 482—Page 53

MOISTURE TESTER

No. 277 Moisture Teller is an inexpensive moisture tester for foundry sands designed for intermittent duty where fast drying is important.



Unit provides a preset drying temperature through fast heating and high static pressure from a high-speed blower. No chemicals are used, and no special calibration is required. Unit can be located in the foundry or in a laboratory.—**Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 483—Page 53

MERCURY VAPOR FLOODLIGHT

Mercury vapor floodlight features a full-floating socket construction which automatically adjusts to variations in lamp sizes and shapes to insure perfect weatherseal. Socket is mounted on a heavy-duty compression spring which cradles the socket in a protective coil of floating steel. Floodlights are available with lamps, transformers, and a variety of devices for different mountings. Units are UL-approved for outdoor service.—**Stonco Electric Products Co.**, 333 Monroe Ave., Kenilworth, N. J.

For More Details Circle No. 484—Page 53

GRINDING WHEEL DRESSER

Heavy-duty grinding wheel dresser has 2⅜-in. diam cutters and a 2-in. cutting face. Unit features six-set bearing assembly to eliminate wear on the pistol-grip handle. Bearing blocks are indexed easily to present new bearing surfaces.

The six holes in each bearing are drilled through to allow the cutters to be changed without removing the

cutter assembly from the head. Cutters are extra high carbon steel, heat treated all the way through, to give long wear. Dresser is suitable for work on medium and large wheels and particularly on wide-faced wheels.—**Machine Products Corp.**, 125 Hollier St., Dayton 3, Ohio.

For More Details Circle No. 485—Page 53

TERMINAL ASSEMBLY

Terminal assembly for brushes is designed to facilitate brush replacement on electric utility equipment and on any motor or generator in which the brushes are difficult to reach. Assembly consists of a stationary clip, easily bolted to the machine, into which either one or two terminals can be snapped. All parts are silver-plated beryllium

copper for minimum resistance.—**National Carbon Co.**, division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 486—Page 53

FIBERGLAS METAL FILTER

Glasweve is a woven Fiberglas mold screen with a special stiffening agent applied. The screen is for straining nonferrous metals at temperatures up to 1600° F. It is said to decrease turbulence and casting porosity and will not contaminate scrap metal.

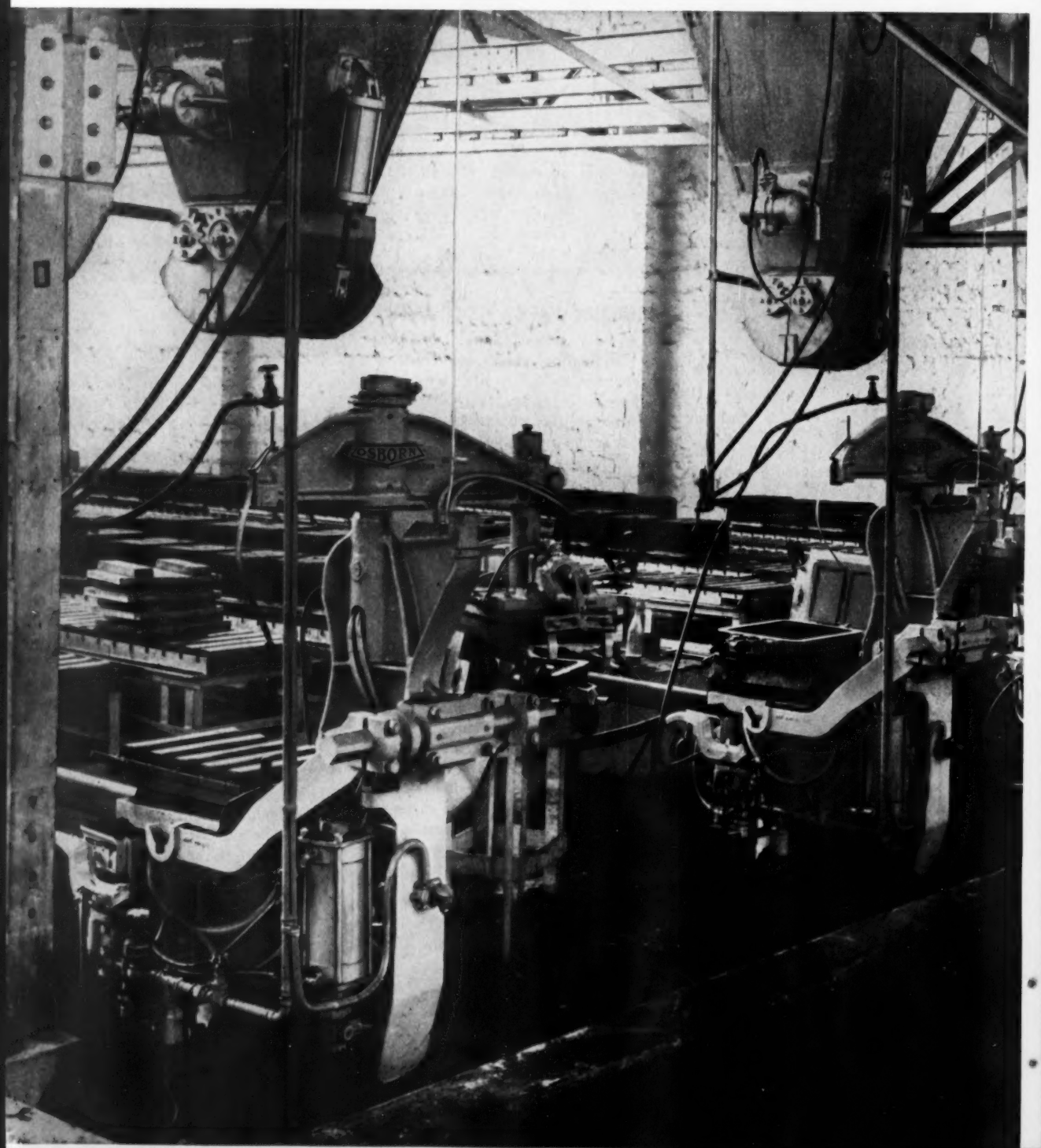
The material can be placed in a gate or bottom of a riser to provide a weak plane when the casting is cooled. The riser or sprue then can be broken off easily.—**Fibrous Glass Products Co.**, West 239 Trent Avenue, Spokane 1, Wash.

For More Details Circle No. 487—Page 53

RAILROAD CAR SHAKEOUT

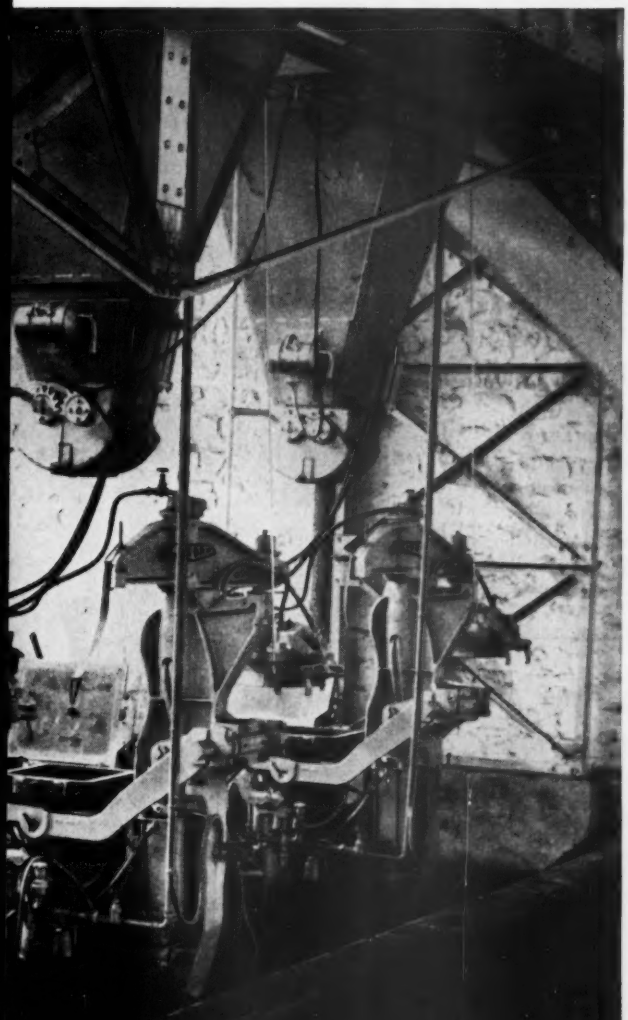
Railroad car shakeout, H-R Trackside, is mounted in a fixed position alongside the railroad track where hopper cars are to be un-

MACHINES THAT MAKE MONEY.....



Mechanizes large match-plate molding to deliver top quality at lowest possible cost

OSBORN ROTA-LIFT®



INSTALLATION of four Osborn *Rota-Lift*® molding machines at Fonderies de Bayard et Saint-Dizier, France.

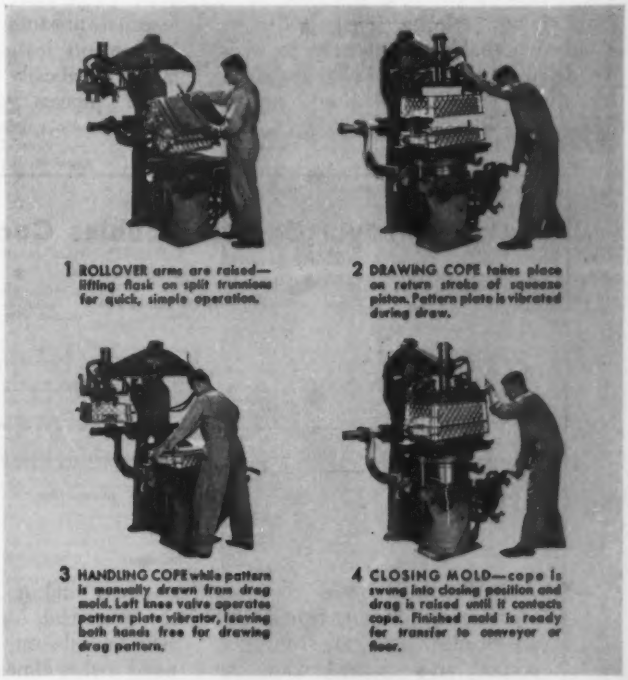
Moneymakers for the foundry . . . Osborn's advanced *Rota-Lift*® molding machines.

Molding from large match-plate patterns today with an Osborn *Rota-Lift* means a *mechanized* operation that pays off in superior castings . . . at lowest cost.

One man . . . one *Rota-Lift* machine easily handle all five major match-plate molding operations—jolt . . . roll . . . squeeze . . . draw . . . and close. Able to handle a wide range of flask sizes, *Rota-Lift* machines are also quickly adjustable for rapid short-run job changeovers.

The *Rota-Lift* is ideally suited and a real asset to any jobbing or semi-production foundry. An Osborn Sales-Engineer will recommend the right model *Rota-Lift* to inprove your competitive position . . . for a *bigger* share of the casting business now.

Write us for full details—and your copy of *Rota-Lift* Folder 25-A.



1 ROLLOVER arms are raised—lifting flask on split trunnions for quick, simple operation.

2 DRAWING COPE takes place on return stroke of squeeze piston. Pattern plate is vibrated during draw.

3 HANDLING COPE while pattern is manually drawn from drag mold. Left knee valve operates pattern plate vibrator, leaving both hands free for drawing drag pattern.

4 CLOSING MOLD—cope is swung into closing position and drag is raised until it contacts cope. Finished mold is ready for transfer to conveyor or floor.

Circle 638 on Page 53

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue • Cleveland 14, Ohio

OSBORN®

MEMBER FEMA

MOLDING MACHINES • CORE BLOWERS
METAL FINISHING MACHINES • INDUSTRIAL BRUSHES

loaded. A powerful, hydraulic cylinder, exerting a force of 14 tons, pushes a vibrating head against the side of the car.

Unit is anchored in the ground and operated remotely. It weighs 2400 lb, has a 7½-hp, high-torque vibrator drive and a 3-hp, high-torque pump drive.—**Hewitt-Robins Inc.**, 666 Glenbrook Rd., Stamford, Conn.

For More Details Circle No. 488—Page 53

BATTERY CHARGERS

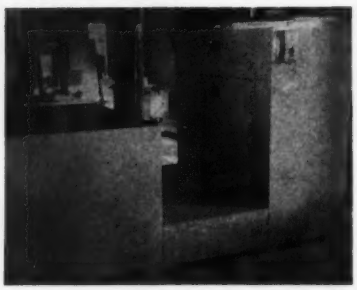
Single-circuit battery chargers are for charging batteries of high amp-hr capacity. Units are rated 7½, 10, and 15 kw, and each is an integral unit, completely automatic in operation. Chargers are designed to charge lead-acid or nickel-iron-alkaline industrial truck batteries.

Motor, generator, and charge controls are housed in a dead-front, monitor-top control cabinet as part of the motor generator set.—**Motor Generator Corp.**, P. O. Box 279, Troy, Ohio.

For More Details Circle No. 489—Page 53

DUST COLLECTING BENCH

High velocity dust collecting bench enables an operator to work from all sides of the gating surface. Bench has fan and filter compartment separate from the grating working surface, but connected by a flat duct 12 in. high. Downtime for repositioning is said to be eliminated.



Installation of the unit requires only that it be put in place and wired to starting switch. For work from all sides at the same level, a platform the same height as the connecting duct can be added to the other three sides of the work area.—**Wolverine Equipment Co.**, 31 Main St., Cambridge 42, Mass.

For More Details Circle No. 490—Page 53

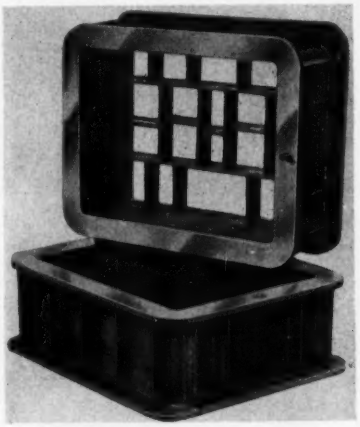
INDICATING TRANSMITTERS

Model 45 Series pneumatic indicating transmitters are for pressure, flow, temperature, liquid level, differential pressure, and dew point. Instruments feature measuring elements specifically designed for each major process variable. Over-all calibrated accuracy of the transmitter, including measurement and output signal, is within ±½ per cent. All instrument components are enclosed in a weatherproof steel case. Universal bracket is supplied for surface or 2-in. pipe mounting. —**Foxboro Co.**, Neponset Avenue, Foxboro, Mass.

For More Details Circle No. 491—Page 53

FOUNDRY FLASKS

Extra-heavy duty foundry flasks feature minimized deformation and high resistance to ramming shock and machine stress. Flanges are



automatically welded to channel walls. All fittings are jig welded. Flasks are said to have good stability under sharply rising heat and pressure of large metal volume pourings.—**Sterling National Industries Inc.**, 7036 West Walker, Milwaukee 14, Wis.

For More Details Circle No. 492—Page 53

MOBILE FLOOR CRANE

Herculift Standard, mobile floor crane, is designed to reduce manpower and speed production. Unit is completely counterbalanced and equipped with adjustable boom with a hook that reaches as far as 6 ft beyond the front edge of the unit.

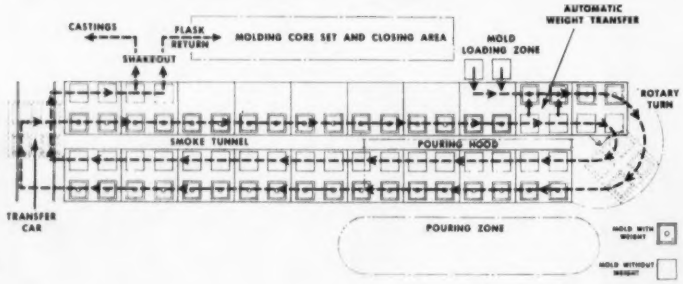
Capable of moving in four directions, the crane's power lift boom lifts and positions loads up to 5000 lb. Boom can be lowered to 1½ ft and raised to 9 ft.—**Colson Corp.**, 7 South Dearborn, Chicago 3, Ill.

For More Details Circle No. 493—Page 53

RADIOGRAPHY MACHINE

Gamma radiography machines use radioisotopes Cobalt 60, Iridium 192, Cesium 137, and Thulium 170 in nondestructive inspection of met-

Mold Conveyor System Doubles Cooling Time



Double MRI mold conveyor system is an indexing type. Molds are loaded onto the conveyor, poured, and removed, while the conveyor is stationary. This system is recommended for use with large, heavy flasks.

A rectangular loop is employed, consisting of two straight runs connected with a rotary turn at one end and a transfer car at the other end. Molds are carried side by side on the cars. Each mold makes almost two complete trips around the loop, nearly doubling cooling time per square foot of floor space.—**C. O. Bartlett & Snow Co.**, 6200 Harvard Ave., Cleveland 5, Ohio

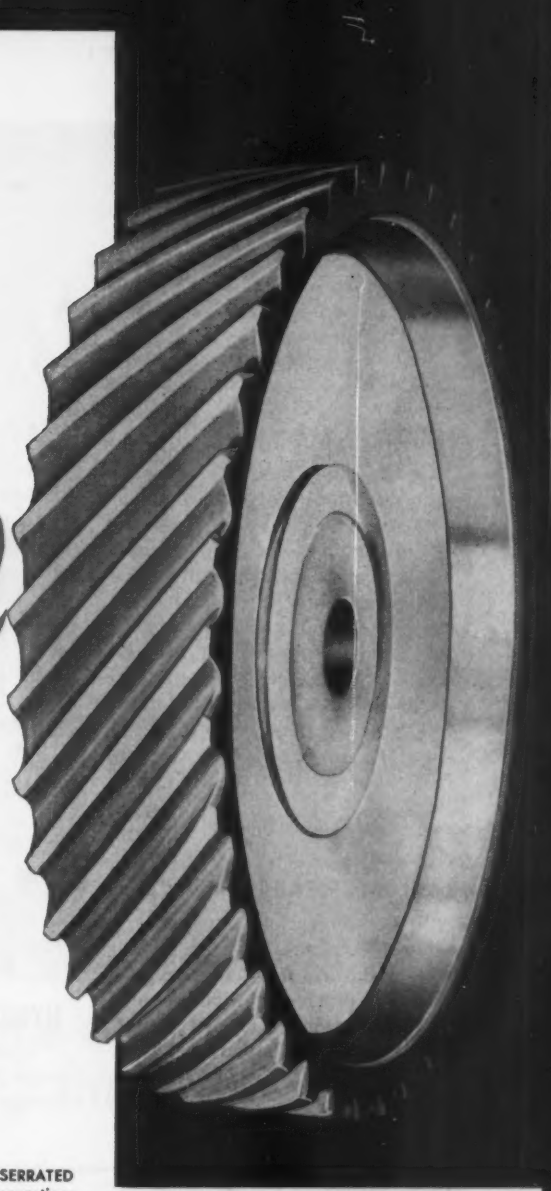
For More Details Circle No. 502—Page 53

New R-100 MOLDED RUBBER CosmoWheel

FOR OFFHAND, SEMI-AUTOMATIC AND FULLY AUTOMATIC GRINDING AND FINISHING OPERATIONS

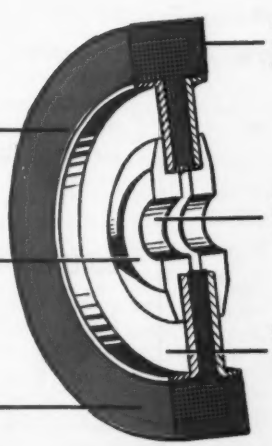
The exclusive, patented features of the newly developed R-100 Cosmo molded rubber contact wheel bring new techniques to grinding and finishing with coated abrasive belts and bands.

Whatever your product or your grinding and finishing operations there is a highly efficient, perfectly balanced, smooth running R-100 Cosmo molded rubber contact to meet your requirements.



Molded Rubber Wheels Permit Use of More Abrasion Resistant Rubber Compounds, Provide Uniform Density — Uniform Serrations and Better Wheel Flexing.

Profit Building R-100 Features



SPECIALLY COMPOUNDED MOLDED RUBBER of closely controlled density yields greater tensile strength and assures iron-clad bonding to the steel discs.

ALUMINUM FLANGES are inserted into the standard wheel arbor holes are machined with precision arbor holes to the diameters required by the users.

THE MOLDED RUBBER TIRES are abrasive resistant . . . oil resistant . . . acid resistant . . . in durometer ranges from 10 to 90.

PLAIN OR MOLDED SERRATED FACES for wet or dry operations . . . with maximum safety.

ALL WHEEL ARBOR HOLES in the two prime steel discs are precision machined to one standard size.

PRIME STEEL DISCS — precision stamped and drawn — form light, rigid wheel sides.

CosmoWheels INC. 1019 W. FULTON ST. CHICAGO, ILLINOIS

Circle 639 on Page 53

al castings and other parts. Fourteen basic machines are offered, with a variety of mounts. All units can be obtained with more than one source position. Most of the equipment can be used for panoramic exposures. Some can be used for beam exposures also.—**Radiation Engineered Services,** Lafayette and Water Streets, Norristown, Pa.

For More Details Circle No. 494—Page 53

FINISHING MACHINE

Combination belt and disc finishing machine has standard 4-in. abrasive belt and 12-in. abrasive disc. A 4¼ x 12-in. platen can be inverted for underside general finishing or deburring of small parts. Removable end guard permits inside contour finishing on the idler drum. A 9¾ x 16¼-in. table furnishes ample work support for finishing large patterns.—**Delta Power Tool Div., Rockwell Mfg. Co.,** 467 N. Lexington Ave., Pittsburgh 8, Pa.

For More Details Circle No. 495—Page 53

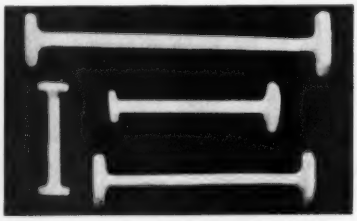
CYCLONE SEPARATORS

Model 36 cyclone separator operates in the range of 4000 to 6000 cfm. Unit features adjustable belt drive to provide a wide range of cfm performances against varying resistances. Long tapering cone design and high inlet velocity are said to give the separator high efficiency. Blower can be located on the clean air side of the collector or remotely, to be used for either blow-through or pull-through operations. Standard base has 30-cu-ft storage capacity for dust and is emptied through an airtight slide gate.—**Torit Mfg. Co.,** Dept. KP, Walnut and Exchange Streets, St. Paul, Minn.

For More Details Circle No. 496—Page 53

PLASTIC GAGGERS

Gaggers designed for use in plaster are made of a plastic material



which will not expand or contract during baking process. This characteristic eliminates cracking of deep, narrow draws in which gagger has been inserted for strength. Plastic gaggers come in four sizes from 1½ to 6 in. long.—**Kant Krack Co.,** 2108 Paradise Blvd., Rockford, Ill.

For More Details Circle No. 497—Page 53

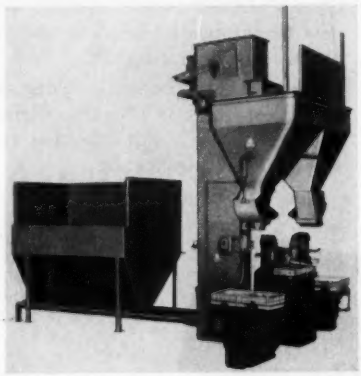
HYDRAULIC ATTACHMENT

Hydraulic attachment dumps all types of drop bottom boxes regardless of contents. Lift truck operator raises boxes to desired height and dumps them. Attachment consists of all-welded body with hardened guide bars and full-floating cylinders. A simple bracket welded to the top edge of boxes catches the bracket on the dumper. Forks remain unchanged. Dumper fits all trucks and comes in four capacities —4000, 6000, 8000, and 10,000 lb. —**Little Giant Products Inc.,** 1530-50 N. Adams St., Peoria, Ill.

For More Details Circle No. 498—Page 53

SAND HANDLING UNITS

Model HS Handy Sandy sand handling unit has capacity of 6 to 7 tons per hr. Model EHS handles up to 20 tons per hr. Units feature separate built-in aerator; automatic shutoff and hopper volume control; sand volume equalizer (to proportion the amount of sand going into each hopper); dribble gate (to seal overhead gates); bucket elevator with full width, heavy duty, rubber-covered belts; low sand storage hopper; and automatic elevator takeup which is air-operated.—**Newaygo Engineering Co.,** Newaygo, Mich.



For More Details Circle No. 499—Page 53

BUILDERS' HOISTS

Rated at 750 and 1000 lb at 200 fpm, heavy-duty builders' hoists are equipped with engines developing 5 and 8 hp at 3200 rpm. Welded steel main frames assure strength and rigidity. Entire units are light, compact, and balanced for easy handling. Positive chain and sprocket drives, friction-resistant bearings in clutches and drums, and oversized brakes for extra-heavy loads are features.—**Muller Machinery Co. Inc.,** Metuchen, N. J.

For More Details Circle No. 500—Page 53

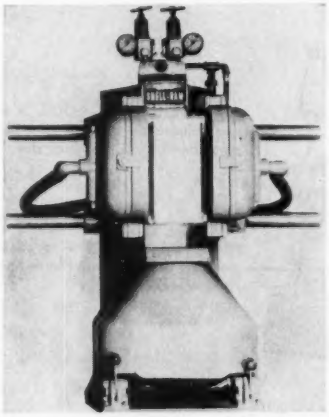
Shell Core Machine Employs Bottom Blow

Shell-Ram bench model core machine invests corebox from the bottom. It uses a comparatively small amount of air and is said to lengthen corebox life and to produce dense, uniform shell cores in both vertical and horizontal sections.

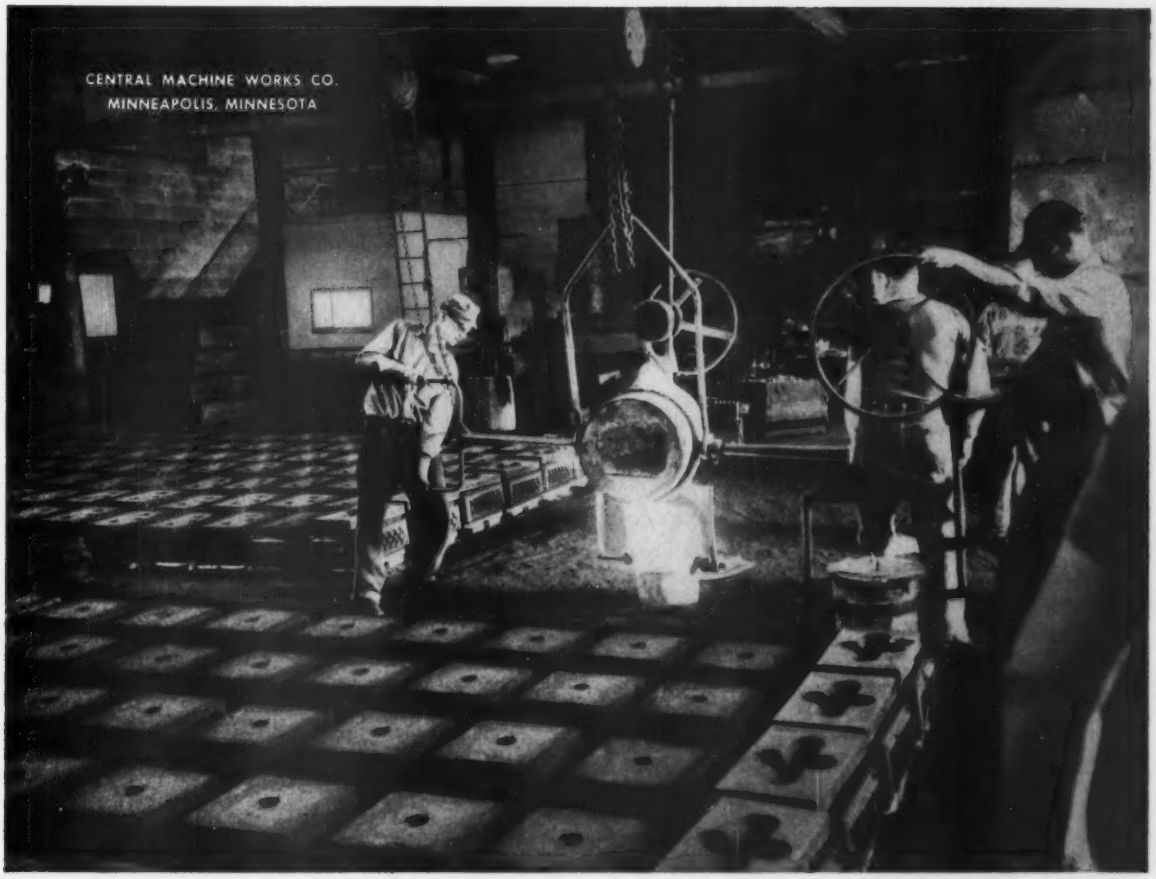
The machine is available either as a hand-operated unit or, as shown, with air-operated levers.

Coreboxes are changeable in seconds, and the machine is readily adaptable to multiple-part coreboxes.

Unit can handle a corebox 12 in. high by 11 in. long and 8 to 10 in. across the parting line. The unit is gas-fired and uses radiant-type burner heads to achieve wide, even heat distribution.—**A. C. Chris Co.,** 9007 S. Ashland Ave., Chicago 20, Ill.



For More Details Circle No. 503—Page 53



"We have found one core oil that can be used on every job in the shop..."

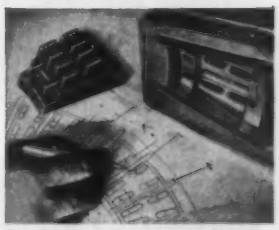
Versatile Cities Service Delco 56 Core Oil Used For Castings From A Few Ounces To Several Tons

"If it's made of gray iron, we can make it..." states Mr. Cliff Englund, Vice President of Central Machine Works Company. This one statement tells the story of Central Machine's versatility. Central has been making special machines and parts for every industry imaginable since 1890.

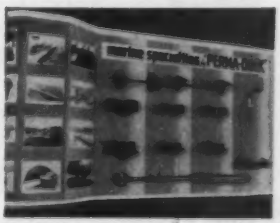
Naturally a great variety of castings is required and Central demands versatility from its core oil. Mr. Englund says, "From the routine to the most complicated cores . . . for castings that weigh a few ounces or may tip the scales at several tons . . . we use one core oil, and one core oil only. Cities Service Delco 56. Even more important than the simplification and convenience of using one core oil is the fact that Delco 56 works where even special core oils have failed."

Cities Service Delco 56 core oil provides this versatility because it can stand the long baking necessary for large cores and give the fast bake so vital to thin core sections. Shakeout properties are excellent and smoke is minimal.

If, like Central Machine, you are looking for a core oil of high quality and wide application, call the nearest Cities Service office. Or write: Cities Service Oil Company, Foundry Sales Dept., 20 N. Wacker Drive, Chicago 6, Ill.



Engineer reviews plans for mechanical street sweeper. Core forms holes for brushes. Central has complete facilities in its new plant including pattern making.



Central is now producing and selling some of its own products. Shown here is a line of dock and mooring equipment for the small boat owner.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Circle 640 on Page 53

Industry Briefs

General Electric Co. will spend $3/4 million in 1960 for modernization of its Elmira, N. Y., foundry. New melting facilities consisting of two hot blast cupolas for melting of gray iron will incorporate modern cinder collectors. Also included are changes in building structures, new pouring equipment, an electric holding furnace, and charging equipment for lifting metal and coke into cupolas. E. R. Oeschger is general manager.

Forest City Foundries Co., Cleveland, has acquired Dostal Foundry & Machine Co., Pontiac, Mich., and will move the firm's permanent mold equipment to one of its two Cleveland foundries. Russel K. Dostal, president of the acquired foundry, and several others of its key personnel will join Forest City.

Harbison - Walker Refractories Co., Pittsburgh, has opened a western district sales office in Los Angeles. C. F. Wenrich, San Francisco sales representative since 1951, is manager.

Techno Fund Inc., Columbus, Ohio, has been organized to provide funds for small businesses, to include capital for current operations, further expansion, initiation of new business ventures, and development of new products. Dr. Clyde Williams, president, Clyde Williams & Co., Columbus, is board chairman and manager. John F. Havens, president, Havens Realtors, is president.

Attalla Pipe & Foundry Co., Attalla, Ala., suffered fire damage Apr. 26, when an estimated two-thirds of its W. Sixth Street plant was destroyed. Fire apparently started in the mill room. Production has been transferred to a recently constructed mechanized pipe building.

E. F. Houghton & Co., Philadelphia, has opened a plant at 54 Tanforan Ave., S. San Francisco. Capacity, which has been increased more than 50 per cent over the former plant at 1500 Davidson Ave., San Francisco, includes 30,000 sq ft of manufacturing space, a new office building, a control laboratory, and 10,000 sq ft of outdoor storage area.

Bay State Abrasive Products Co., Westboro, Mass., has acquired Felker Mfg. Co., Torrance, Calif., which will be operated as a subsidiary, under direction of Elden L. Auker, Bay State vice president. Felker produces diamond abrasive-cutting wheels and accessory equipment. Lester F. Kusmich continues as manufacturing manager, and Fred K. Ryan, sales manager.

PUMP CASTINGS: More than 130 tons of metal will be poured at Gould Pumps Inc., Seneca Falls, N. Y., in making 2100 ductile iron castings to build several hundred pumps for Titan missile bases now under construction. These castings range in size from ½ to more than 1800 lb. The pumps consist of a variety of types, including the double-suction centrifugals shown here

Albco Foundry Inc., Youngstown, Ohio, has acquired the plant of the former Lisbon Feed Service mill, Lisbon, Ohio, from Columbiana Development Corp. The new facility has 12,000 sq ft, compared with 6800 at the Youngstown foundry. Operations will be transferred about July 1.

General Foundry Service Corp., Oakland, Calif., is constructing new and enlarged headquarters in San Leandro, Calif. Facilities will triple the size of the present Oakland plant and will house office facilities and sales-service departments. The move from Oakland is scheduled for Sept. 1.

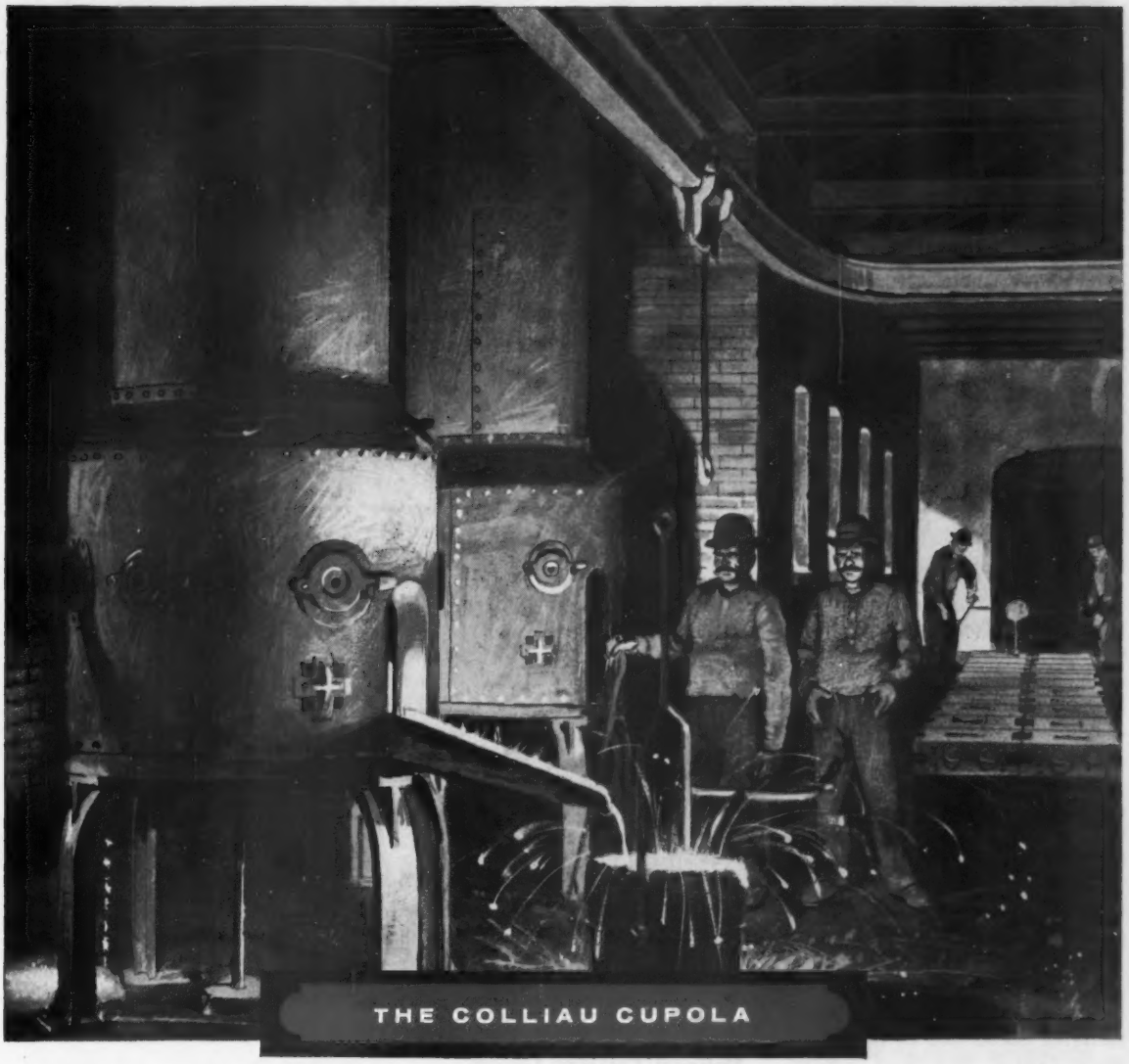
General Malleable Corp., Waukesha, Wis., has changed its name to General Casting Corp. to conform to the actual activity of the firm. For the past six years, casting has been exclusively in gray iron. No change in officers or sales representation is anticipated.

Doehler-Jarvis Div., National Lead Co., Toledo, Ohio, has established a Brazilian subsidiary, Industrias Doehler do Brasil S/A, Caixa Postal 910, Sao Paulo, Brazil, which will make and finish zinc, aluminum, and magnesium diecastings.

Lynchburg Foundry Co., Lynchburg, Va., has been named a recipient of one of the Freedoms Foundation awards for "contributions in helping to bring about a greater appreciation and understanding of the American Way of Life during 1959," through its publication "The Iron Worker." The award is a George Washington honor medal.

Industrial Heating Equipment Association Inc. reports new orders for industrial heating equipment in March totaled $9,345,000, up 38 per

Gray Iron Foundry Milestones—No. 5



THE COLLIAU CUPOLA

ONE of the most significant developments in the history of the Gray Iron Foundry Industry was the invention of the cupola in the early 18th century.

The first cupola was introduced in the United States about 1815, but it wasn't until 1874 that the first prefabricated commercial cupola, the *Colliau*, was manufactured in this country. The Colliau offered several new features including a hot blast, a double row of tuyeres, and other improvements which produced a fast, economical iron melt.

The introduction of the cupola into the foundry marked the point at which foundry operations and steel making went their separate ways . . . and each eventually became a vital factor in the American economy.

As a supplier of quality foundry coke and pig iron, Pittsburgh Coke & Chemical Company is proud to contribute to the continuing growth of the great Gray Iron Foundry Industry.

Reproductions of the "The Colliau Cupola," suitable for framing, may be obtained without charge by writing to the Coke & Iron Division, Pittsburgh Coke & Chemical Company, Grant Building, Pittsburgh 19, Pa.

COKE & IRON DIVISION
PITTSBURGH
COKE & CHEMICAL CO.
GRANT BUILDING PITTSBURGH 19, PA.

Neville Pig Iron and Neville Coke for the Foundry Trade 1840

HOW To Do It

FOUNDRY will pay a minimum of $15 for each "How To Do It" idea submitted and published

Molten Alloy Additions Reduce Stainless Steel Melting Time

By TOHRU TAKI
Kubota Iron & Machinery Works Ltd.
Chuko Plant, Osaka, Japan

FERROCHROMIUM heated by heavy duty oil burners used to be added gradually to baths of low carbon steel melted in a 5-ton basic arc furnace at our plant. It was felt that the production of 13 per cent chromium stainless steel by this method was comparatively slow. Furthermore, refractory in the furnace roof and exposed wall was apt to fuse, resulting in a breakdown of the slag.

To remedy the situation a high frequency induction furnace is used to melt a 1-ton charge of the 60 per cent ferrochromium-low carbon additive while a 4-ton charge of low carbon steel is melted in the basic arc furnace with an ordinary white slag.

The molten high chromium content alloy is added to the bath of the larger furnace without the need of increasing temperature to compensate for the chilling action of a comparatively cold metal addition. Refining of the blended metal goes on smoothly and the heat of clean stainless steel is completed rapidly.

cent from the February volume of $6,784,000. Total net new orders in March for induction heating equipment came to $934,000, down 25 per cent from February volume of $1,248,000.

Mechanical Handling Systems Inc., Detroit, has appointed Ajay Co., 3301 W. Beverly Blvd., Montebello, Calif., as representative in southern California. J. W. Hiatt and F. P. Alcock head the Ajay organization.

Scientific Cast Products Corp. has merged its two matchplate manufacturing plants into its main facility at 1390 E. 40th St., Cleveland.

Ransome Co., Scotch Plains, N. J., has appointed J. A. Cunningham, 2025 Trenton Ave., Philadelphia, distributor for eastern Pennsylvania and southern New Jersey, and Brooks Welding Supply Co., Chattanooga, Tenn., distributor for central Tennessee.

American Gilsonite Co., Salt Lake City, Utah, joint affiliate of Standard Oil Co. of California, and Barber Oil Corp., New York, has expanded its refinery near Grand Junction, Colo.

Shieldalloy Corp., Newfield, N. J., has opened an office in the Oliver Bldg., Pittsburgh, to market its ferroalloy products, metals and alloys, minerals and ores in western Pennsylvania and Ohio. William Brand is in charge of the new office.

Morgan Engineering Co., Alliance, Ohio, has licensed Dominion Bridge Co. Ltd., Montreal, Ont., Canada, to build and sell its equipment in Canada.

Thermo Electric Co., Saddle Brook, N. J., has opened an office at 19458 Ventura Blvd., Tarzana, Calif., to cover the southern part of the state. Joseph J. Ghiglia is manager.

National Castings Council Picks Nutter as President

Albert M. Nutter, treasurer, E. L. LeBaron Foundry Co., Brockton, Mass., and president, Gray Iron Founders' Society, was elected president of the National Castings Council at the annual meeting of that organization held in Philadelphia, May 12.

R. B. Parker, assistant to the president, American Brake Shoe Co., New York, and president, Foundry Educational Foundation, was elected vice president. F. Ray Fleig, president, Smith Facing & Supply Co., Cleveland, and a representative of the Foundry Facings Manufacturers Association, was re-elected treasurer, and Frank G. Steinebach, publisher and editorial director, FOUNDRY, was re-elected to be secretary.

Representatives at the annual meeting heard reports of activities of member organizations, discussed

R. B. Parker

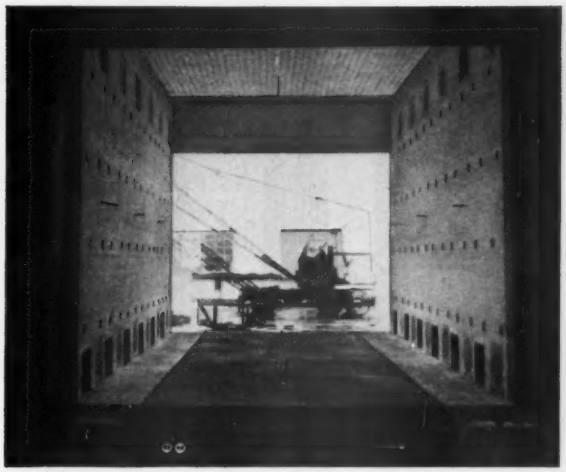
A. M. Nutter

the growing competition of foreign goods in the foundry and allied industries and heard Lowell L. Henkel, Department of Arts and Manufacture, Smithsonian Institution,

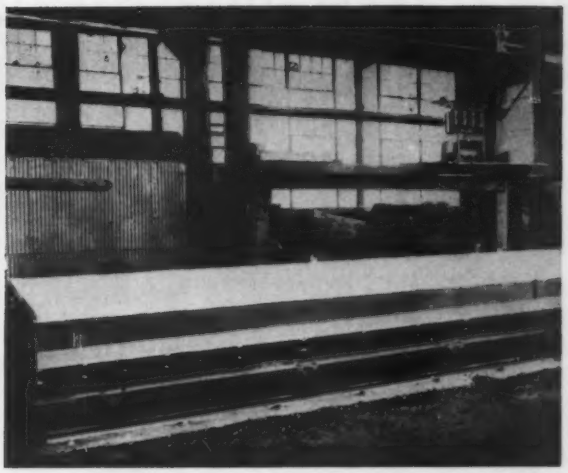
F. R. Fleig

F. G. Steinebach

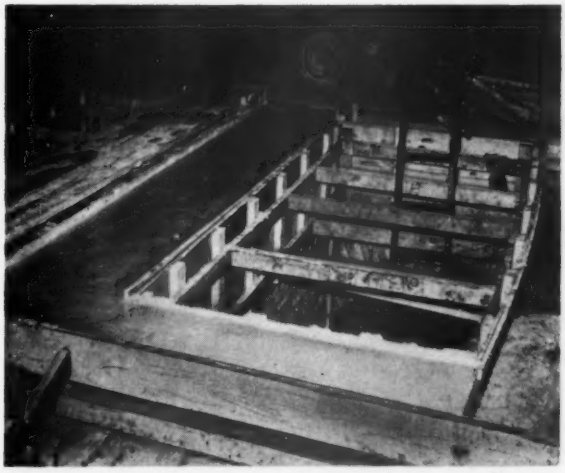
Washington, tell of a new exhibit of the iron and steel industry, including the production of castings, to be presented in the new building now under construction.



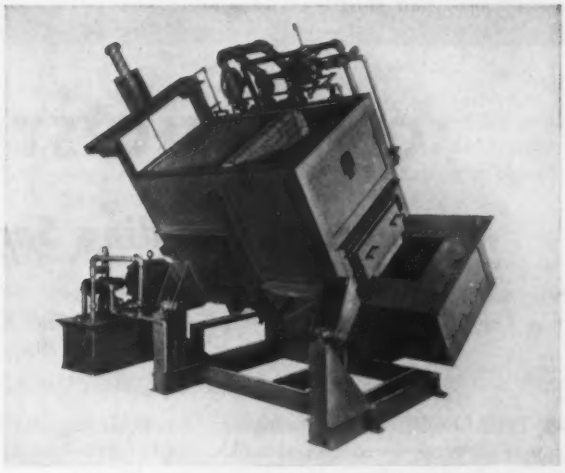
In this stress-relieving furnace, B&W Kaocrete-D is used on the floor ledges, car top, in the door jamb and at the end of the flat roof where it withstands the abrasion of the door. This material is specially designed to withstand severe abrasive conditions and mechanical abuse.



Heavy duty car top service requires a high strength castable. B&W Kaocrete-D is excellently suited for this service at temperatures to 2500 F. B&W Kaocrete-32 is recommended for service above this range.



B&W Kaocrete-32 has been cast to form the curb walls of a soaking pit. When mechanical abuse from ingots damages the curb, Kaocrete-32 has the necessary properties to localize the damage, thus maintaining the serviceability of the rest of the curb.



The castable lining of this aluminum reverberatory furnace must have unusually high strength to withstand the considerable physical abuse of charging, operating and cleaning, while resisting the penetration of the molten metal. Kaocrete-D is widely used in this application.

How B&W refractory castables solve abrasion problems

Refractory castable linings used in metal-working furnaces are often subjected to severe mechanical abuse. Scraping by hand tools, loading and unloading, and the action of the molten metal and particle-laden gases all affect the life of refractories. Among B&W's line of refractory castables are two that are particularly suited to withstand unusual abrasive conditions. They are B&W Kaocrete-D and B&W Kaocrete-32, both of which have been used successfully in many demanding applications.

B&W Bulletin R-35A gives additional information on versatile B&W refractory castables. Write for copy to The Babcock & Wilcox Company, 161 East 42nd Street, New York 17, N.Y.

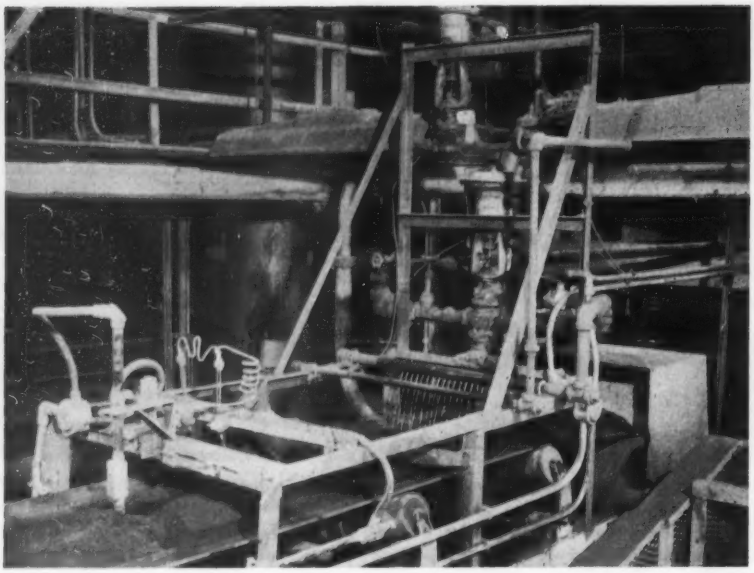
R606R

B&W

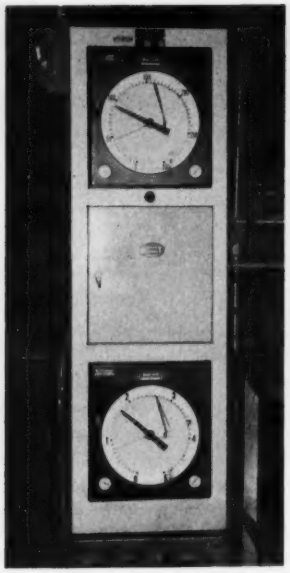
THE BABCOCK & WILCOX COMPANY

REFRACTORIES DIVISION

B&W Firebrick, Insulating Firebrick, and Refractory Castables, Plastics, Ramming Mixes, Mortars, and Ceramic Fiber.



Probes in left foreground measure temperature and moisture content of sand on conveyor. Water addition is made from pipe, foreground, behind probes



Control unit uses probe readings to figure water addition

CLOSE MOISTURE CONTROL

Improves Molding Sand

By ROBERT H. HERRMANN
Associate Editor

● THE PROBLEM of an adequate supply of properly controlled molding sand arose at Buick Motor Div., General Motors Corp., Flint, Mich., shortly after Buick started modernizing its foundry in 1954.

The modernization program has included seven new molding lines, the most recent one having been put into production in April, 1959. Newer, faster molding machines on the lines consume sand at the rate of 300 tons an hour. The system in each molding line holds 100 tons of sand. Consequently, sand must go through the preparing, molding, return cycle three times an hour.

Other factors complicating the control problem include (1) the reuse of a given quantity of sand many times a day with very little provision for tempering mixed sand, (2) the combining of spill sand containing adequate moisture with dry shakeout sand, (3) the effect of downtime and start-up such as occurs during the lunch period, and (4) variations in jobs run on the molding lines.

Screw-type, continuous mixers used on each line have the capacity to process the sand, but manual control of additives either as separate ingredients or as a slurry gave trouble, particularly with moisture content. It could not be held within a range narrow enough to meet Buick foundry requirements.

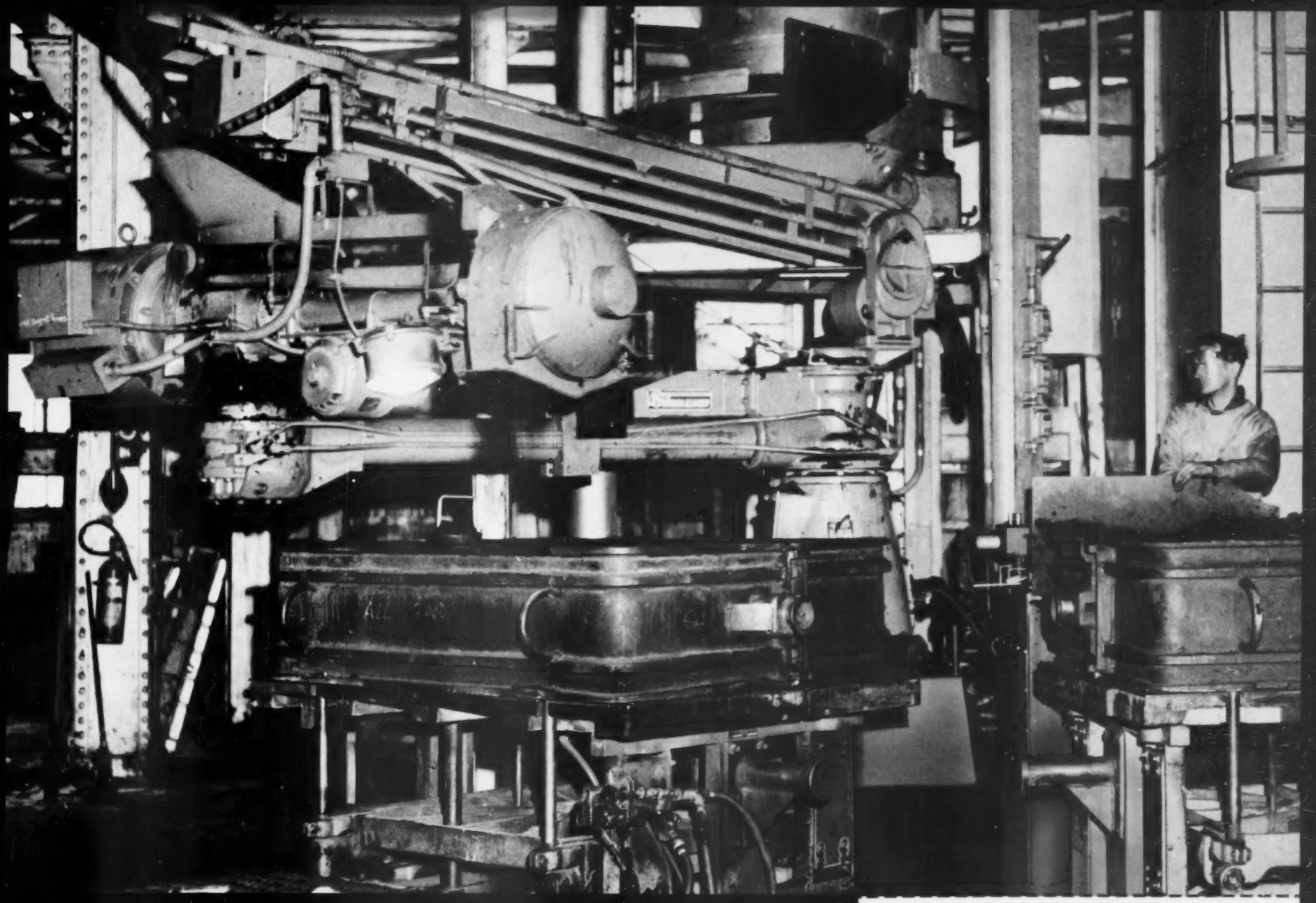
As a result, automatic equipment for the continuous addition and control of moisture in the sand was installed on each line. The equipment incorporates two probes immersed in sand on a conveyor belt. One measures sand temperature and the other moisture content. That information is fed to the control unit which actuates a valve to supply the correct amount of water to sand being carried by the belt to the continuous mixer.

The automatic equipment holds moisture content of the sand to 3.2 per cent ± 0.1 as compared with the previous hand operation of 4.2 ± 0.4. The standard deviation with the automatic equipment is about one-fourth that obtained by manual control. In addition, because of the close control, the average moisture content of the sand has been reduced almost 1 per cent. This has resulted in castings with better surface finish and otherwise improved quality.

Sand mixes on the seven molding lines vary, depending on the size and type casting being poured. In general, however, moisture falls within the range of 3.1-3.3 per cent, seacoal is 4.5 per cent, and clay is 7-9 per cent. Green compression strength is 12 to 16 psi and permeability is 100 to 120. New sand additions to the systems consist of 75-80 AFS bank sand and 44-46 AFS sharp sand, mostly from cores.

(*Concluded on Page* 169)

Circle 643 on Page 53→



CAPACITY FOR TOMORROW

Slinger quality combined with *real* productive capacity . . that's the Hydra-Slinger story at Producto Machine Company of Bridgeport, Conn.

NOW—50% GREATER PRODUCTION

The Hydra-Slinger—Speed Draw installation, operated by two men, increased production 50%. Hard, uniform ramming and accurate draw provided quality consistent with Producto tradition. Three pairs of Speed Draws, easily moved in and out of ramming area, handle Producto's wide range of work.

TOMORROW—*Capacity to meet the demands of a growing industry.* Team the Hydra-Slinger with other B&P equipment such as the Roto-Mold Turntable and or Rol-A-Draw for a highly productive unit tailored to *your* requirements. You never outgrow a Hydra-Slinger . . whatever production demands the future may bring, B&P Hydra-Slingers assure capacity for tomorrow at *no additional cost today!*

Sure I'm interested* in your research and its results!
Send me the whole story on:

- ☐ HYDRA-SLINGERS
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- ☐ SPEED DRAWS
- ☐ MULBARO
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**NO OBLIGATION OF ANY KIND*

B&P HYDRA-SLINGER—the one unit that is both productive and flexible!

B&P research answered the foundryman's need for productivity without loss of flexibility. The economical Hydra-Slinger is an easy-to-operate unit that is equally efficient regardless of production fluctuations.

LOW-COST INSTALLATION

No extensive or complex sand systems needed. No expensive modification of flasks or pattern equipment required.

SANDSLINGER QUALITY

Of course, Hydra-Slinger provides the famous Sandslinger quality—hard, uniform ramming regardless of flask size or depth—true-to-pattern molds—improved casting finish. The flexible Hydra-Slinger can be used with Rol-A-Draw and Roto-Mold turntable or loop conveyor to meet varied production requirements. Automatic Hydra-Slingers are available for repetitive work.

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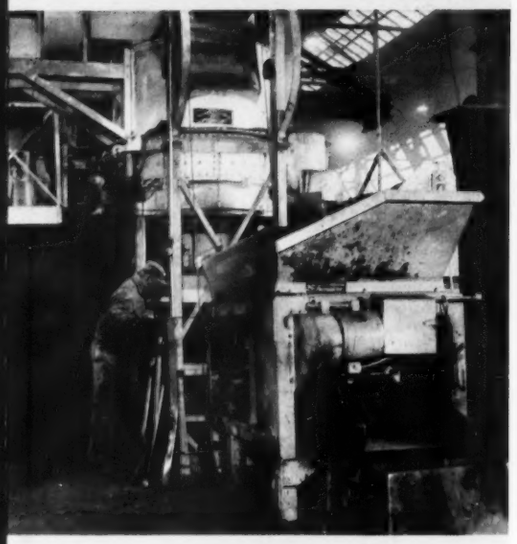
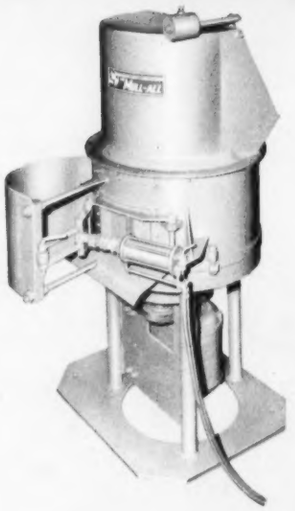


Sand Control for Jobbing Foundries!

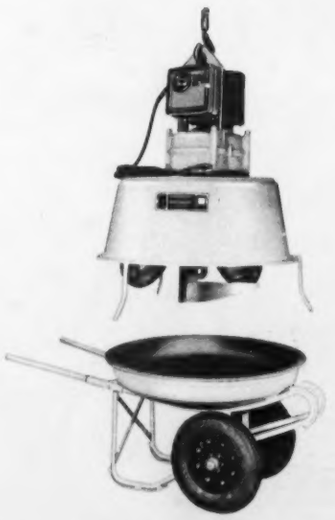
Jobbing foundries need no longer be hampered by the inadequacies of floor sand-cutting methods. Beardsley & Piper Speedmullor-Preparator Units provide complete sand conditioning and mulling for foundries where such sand preparation was formerly not feasible. Here are all the advantages of complete conditioning and mulling—throughout the foundry—at a very moderate cost. These modern space-saving units provide a fully controlled sand practice at a cost well within the budget of the average small jobbing foundry.



Low-Cost, Compact Mulling Unit!

The Mull-All has been especially developed to fill the pressing need for a low cost, highly productive, but flexible unit. Here is a complete ready-to-operate-package with all auxiliary equipment and controls to assure batch-after-batch uniformity. The Mull-All is equally effective in the preparation of any type of facing, molding or core sand.

The capacity of this compact, highly productive unit is approximately 6,000 pounds per hour. Average mulling cycles are three minutes. The Mull-All is also available for low cost preparation of shell sand.



Mulbaro—the Really Portable Mullor!

Real portability with fast, thorough preparation—that's the Mulbaro. Mulled sand is moved to the molder or coremaker in the same barrow used for mulling. The efficient Mulbaro can be used with two or more barrows—after one batch is mulled and moved away, a second barrow can be placed in mulling position for a new batch. The high-agitation plow design and hemispherically shaped barrow bowl insure complete mulling of any type of core, molding, or shell sand in short time cycles.

USE THIS CARD TO LEARN ABOUT YOUR STAKE IN B & P RESEARCH

Prepared molding sand is held in a 56-59 AFS fineness range.

Additions of clay consist of half western and half southern bentonite. The clay mixture and seacoal are combined with shakeout and spill sand for introduction to the sand systems on six of the molding lines. On line seven, the newest line, clay and seacoal are added directly to the mixer.

Prepared sand is delivered by belt conveyor to hoppers over molding machines. High-low level probes in the hoppers control operation of plows to maintain an adequate supply of sand.

The automatic moisture control equipment used on these molding lines is manufactured by Harry W. Dietert Co., Detroit.

D & B Releases Publication To Aid Small Businesses

Roy A. Foulke, vice president, Dun & Bradstreet Inc., New York, is the author of "Inventories and Business Health," a handbook for small businesses. The booklet illustrates some common inventory problems and shows how to avoid them.

The publication lists ratio information for many lines of manufacturing, wholesaling, and retailing. Studies includes a 1958 table of 14 important ratios for 72 lines of business activity; a table of 14 important median ratios for 70 lines of business activity, with five-year averages; and a study on comparative ratios by tangible net worth groups, 1955-1958, which indicates the direction of profits for manufacturers.

The booklet is distributed by Dun & Bradstreet Inc., Publications Div., P. O. Box 803, Church Street Station, New York 8, N. Y. Price is $1.

Book Review

The Manufacture of Iron and Steel, Vol. 2, by G. Reginald Bashforth, cloth, 390 pages, 5½ x 8¾ in., published by Chapman & Hall Ltd., 37 Essex St., London, W.C. 2, England. Price 40s.

This second edition of a textbook designed for the student and as a reference in industry, presents the basic principles underlying the various processes and plant equipment in the steel industry.

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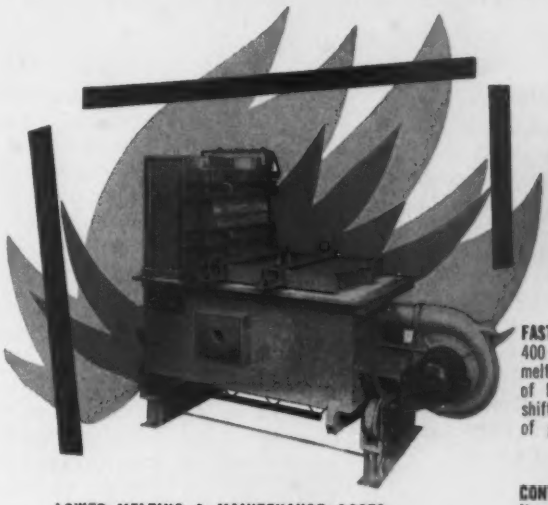
FUEL SAVINGS UP TO 50% REPORTED USING REDA GAS-OIL FIRED FURNACES!



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FASTER MELTING — One 400 series Reda Furnace melts up to 11,000 lbs. of brass or bronze per shift, and up to 6,000 lbs. of gray iron per shift.

LOWER MELTING & MAINTENANCE COSTS— One man can operate a Reda Furnace . . . No daily repairs needed!

CONTINUOUS POURING— No waiting until floors, flasks, boards, etc. are filled with molds!

FURNACE DIVISION — WRITE TODAY FOR DESCRIPTIVE BULLETIN

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Circle 644 on Page 53

Pre-Alloyed Furnace Charges

at a cost less than the price of their original components!

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● These Pre-Alloyed Furnace Charges from Security Alloys, pioneer processors of alloyed nickel, will help reduce your melting time because of their high density and uniform analysis. Tailor-made to most commercial and military specifications, requiring fewer foundry additives and permitting easier prediction of casting analysis.

Color-coded and packaged to your requirements at no extra cost.

For more information on how our Pre-Alloyed Furnace Charges can save you time and money, *write to Foundry Division, Security Alloys Company, Incorporated, 3106 West 49th Place, Chicago 32, Illinois or phone PRospect 6-8500.*

SEND FOR FREE POCKET-SIZE ALLOY SLIDE CHART
Complete analysis of over 100 nickel-cobalt alloys

FOUNDRY DIVISION

SECURITY ALLOYS CO. INC

Circle 645 on Page 53

Foundry Developments

By EDWIN BREMER

Metallurgical Editor

May Solve Problem

FIBER reinforced metals will provide a breakthrough in obtaining high tensile strengths when the details are worked out, according to Horizons Inc., Cleveland. Indications are that presently an 80 Ni-20Cr alloy is being employed with aluminum oxide fibers. Problems to be solved are fiber-to-metal ratios, fiber dimensions for optimum strength, wetting and bonding techniques, and fabrication methods to maintain uniform dispersions of fibers in the metal matrix.

Low-Sulfur Coal

SIGNIFICANT results leading toward the probable reduction of sulfur in bituminous coals have been achieved by Bituminous Coal Research Inc. during fundamental research under cosponsorship of the electric utility and coal industries. The study is part of a two-project program for reduction of atmospheric contaminants in flue gases, and is sponsored by the Association of Edison Illuminating Companies and Edison Electric Institute, jointly representing investor-owned electric utility companies, and Bituminous Coal Research Inc., representing the coal industry.

Work has resulted in removing a substantial amount of pyritic sulfur from five high-sulfur bituminous coals, and results of the project are expected to be of great financial significance to steel, chemical, general manufacturing, and other industries which burn coal or use it as a raw material in manufacture of other products.

High-Strength Steel

OUTSTANDING improvement in mechanical properties of high-strength steels and other alloys is claimed for a heat treating process developed by Research Development Corp. of America, Gardena, Calif. No details of the procedure are given, but it is implied that resultant fine-grained structure plays an important part.

One of the several illustrations indicating results obtained is 4140 steel (0.40 C, 0. 85 Mn, 0.95 Cr, 0.20 Mo) which with standard heat treatment shows 240,000 to 260,000 psi tensile, 210,000 to 220,000 psi yield and 6 to 8 per cent elongation. With the special process the tensile is 338,000 psi, yield 320,750 psi, and elongation 9 per cent.

Measures Thickness

MEASUREMENT of tiny variations in wall thickness of vanes and blades for an experimental Allison turboprop engine is being accomplished through a procedure developed by Dr. W. J. Meyer and W. H. Lange, General Motors Research Laboratories, and W. J. Shelly, Allison Div. The method consists of dissolving samarium-153 in hydrochloric acid, placing the solution in

the hollow blade and determining the absorption rates of radiation with a small Geiger-Mueller tube. The engine blades, produced by investment molding, are about 1¼ in. long, 1 in. wide, with wall thickness from 0.010 to 0.050 in. Accompanying illustration shows procedure and fixture employed for taking measurements at 12 locations.

Resists Green Rot

MODIFIED 80-20 nickel-chromium containing minor percentages of iron, silicon, cobalt, manganese, and columbium has been developed by Hoskins Mfg. Co., Detroit, for resistance elements in electrically-heated, controlled atmosphere heat treating furnaces. It is said to possess excellent resistance to carbon pickup, and to corrosion in reducing atmospheres.

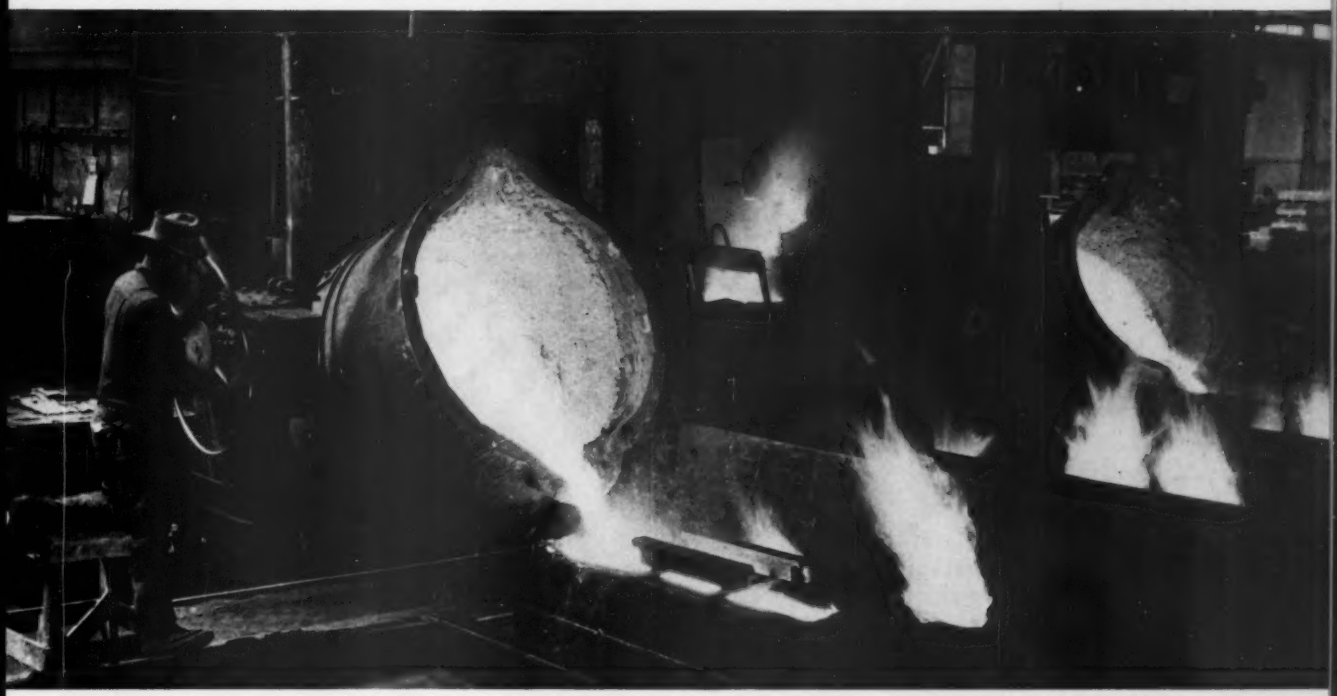
The alloy is highly resistant to attack by sulfur, chlorine, and other contaminants often present in controlled atmospheres, and is reported as not susceptible to green rot, a preferential intergranular oxidation of chromium, frequently encountered under certain conditions in the critical intermediate temperature range of 1500 to 1800° F.

Plastic Patterns Form Ceramic Shell

PROBLEMS limiting the use of polystyrene patterns for investment casting to the flask molding process have been overcome, according to Precision Metalsmiths Inc., Cleveland. This company now is using polystyrene patterns to produce investment castings with the ceramic shell process.

Differences in expansion of the polystyrene and the ceramic mold material formerly caused the shells to crack during removal of the pattern from the shell. Precision Metalsmiths uses the burnout procedure for pattern removal, but details of the procedure are lacking. Possibly the secret is use of a refractory material bonded with a combination of silicate of soda and phosphoric acid which provides a shell having high green and fired strengths, and perhaps the heat in burnout is applied in such a manner that disintegration of the pattern begins at the interface of pattern and shell.

REDUCE GAS WITH WERSMITH #401 CORE OIL . . .



#401 EVOLVES BUT HALF AS MUCH GAS AS OTHER OILS!

HERE'S PROOF!

Gas evolvement test run on briquette cores in nitrogen inert atmosphere at 1800°F. using sand and core oils, but no cereal binder.

	1 min.	2 min.	3 min.
WERSMITH #401	5.8 cc	6.6 cc	7.8 cc
Conventional Core Oil	11.2 cc	11.6 cc	13.0 cc

If core gas is your problem, here's good news! WERSMITH #401 core oil tests out, conclusively, as evolving but 50% as much gas as other core oils now on the market. (See chart at left.) Think what this can mean to you! For burner cores, alloy steel cores, core molds, malleable cores — WERSMITH #401 will bake out thoroughly and faster. You get a better "clear-through-bake" in less time. Less danger of unbaked core sections. Cores are harder — resist penetration and "burn-ins". After pouring — easier core shake-out. You'll find, too, that WERSMITH #401 is very fluid, free from stickiness and much easier to use.

We're "very high" on this product of ours — but, frankly, you've got to try it to appreciate it. There's no charge for small-quantity samples — trial drums cost more, so we'll have to bill you. But, either way, you're sure to profit! A letter, wire or phone call will get #401 on its way to you at once.

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"WERSMITH" CORE OILS COST LESS TO BUY...COST LESS TO USE

Circle 646 on Page 53

Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"A prophecy factor is needed when we try to figure the costs of a prospective job which has little in common with jobs done before"

Cowardly Costing

● BEING SOMEWHAT backward when it comes to the mysteries of foundry cost accounting, I have made a practice of reading and studying the articles on that subject which appear from time to time in FOUNDRY. I believe I'm beginning to get the ABCs of the subject through my thick skull, and I always have made a practice of keeping a log of my activities—sort of a diary, that is, with projects, successes and failures, the reasons therefore (estimated), and dates (time on and time off). Then too, when a job is finished, I manage in a crude and laborious sort of way to gather up the loose ends, add them together, and arrive at my out-of-time and out-of-pocket cost. This, of course, is after the job has been finished—past history, in other words.

But, doggone my hide, what throws me for a double loop is a job that's not even started, which exists only in the imagination, hanging by the slender thread of hope; a job that may be mine or somebody else's, depending on the price I conjure up. It's a case of prophecy versus history.

Reason tells me, of course, that the jobs we have completed, delivered, and been paid for must have much in common with those up for consideration. But, on the other hand, memory weakens reason at the recollection of several instances when I was given the go-ahead on some jobs without a price.

One job comes to mind in particular. It involved a model builder; a complicated assortment of core plugs, boxes, and cores; and a lengthy period of tryout including inevitable changes in patterns and coreboxes. My client's enthusiasm when he saw the finished castings was worth all of the sweat and loving care I had invested in his job. But, boy, when he asked "What's the damage, Doc?" and I told him, I thought he was going to faint. Then he ripped off one of the choicest couplets of swear words I have ever heard.

That's the price for *this*?

End of a Friendship—Our friendship suffered as a result, although on the basis of friendship I had trimmed the honest and actual cost well into the red. So help me! Lee Hobby Foundry never is going to take on another one of these price-evading go-aheads as long as I'm connected with this outfit.

But, even so, Cowardly Costing still is a problem. We have a job right now—no patterns and four delicately cored sample castings, with no questions asked about price, but some sort of an estimate required in a most friendly, almost buddy-buddy atmosphere. I wanted these folks for clients because I sniffed repeats and future new orders.

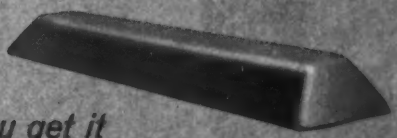
Before submitting my estimate, I girded up my loins and with set jaw researched my log book for previous jobs with enough in common with the proposed one to give me a realistic basis for price. It turned out that there wasn't very much in common, but, based on what there was, I added up by bits of similarity, together with my best guesses as to what I was up against, and, like my previous client friend, almost fainted when I saw the total. Even after checking and double checking I didn't have the guts to stand up like a man and give my prospective clients a realistic price.

This customer needed 200 cast-

Circle 647 on Page 53→

perfect

CONTROL...



you get it

with **MELTRITE**

Controlled Cupola Charge* is a certainty when you use Interlake's famous Meltrite pig + steel + your own returns. YOU GAIN: (1) Shippable castings at lower cost. (2) Greater customer satisfaction.

*** CCC**

Wherever you are, a PM & Company Metallurgist is ready to talk with you about Controlled Cupola Charge and Meltrite—the 100% merchant pig iron that's always in dependable supply.

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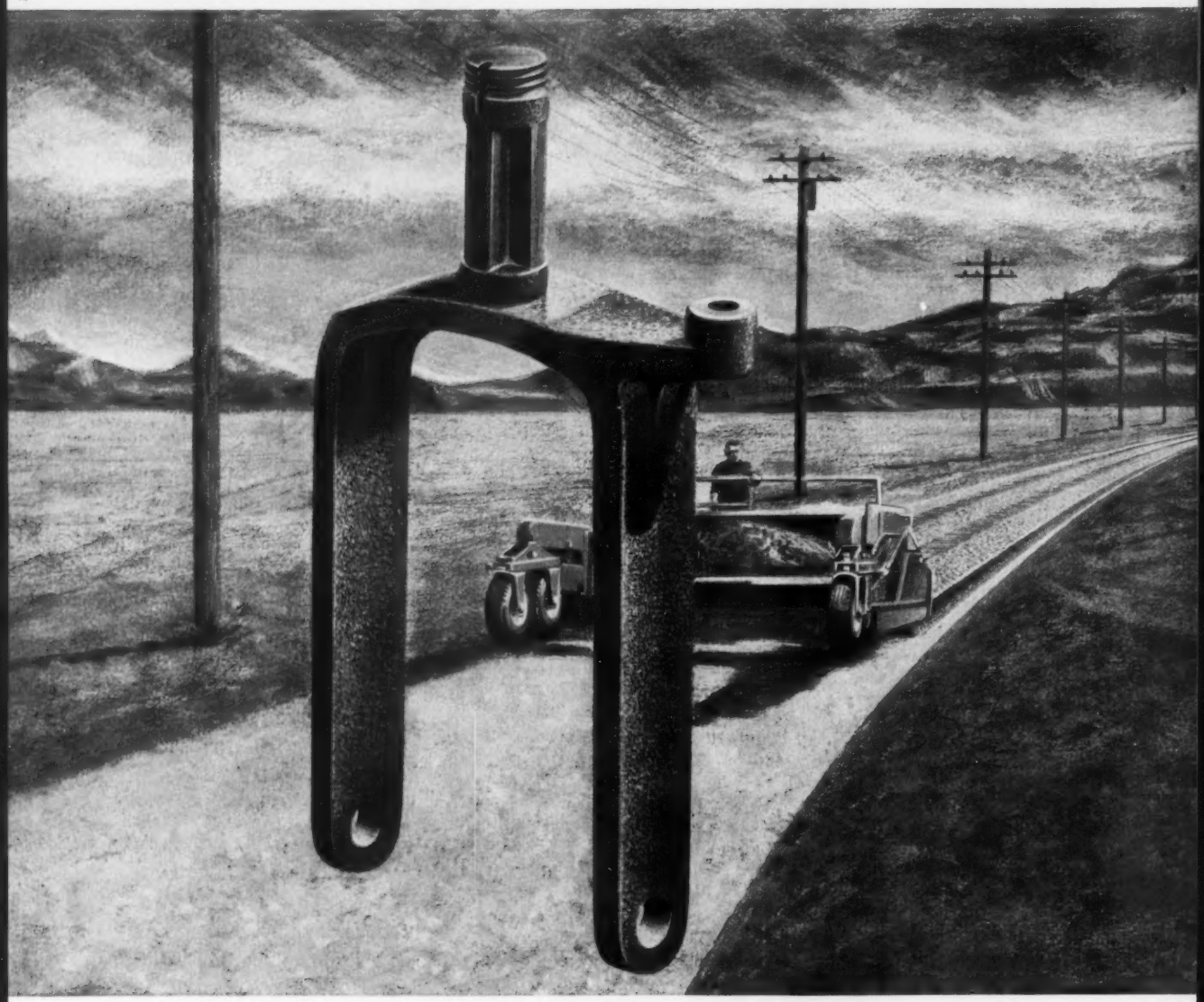
How the Foundry Industry Serves America . . . #6 of a Series



CAST IRON WHEEL FORK REPLACES WELDMENT . . . CUTS COST 29%

Rugged construction of every single part is vitally important in the manufacture of road building equipment.

Capable of spreading up to 400 tons of base materials per hour, the aggregate hopper of the 12-ton base paver, shown above, is supported and steered by front wheel forks. These must take a terrific pounding day after day, to assure maximum service life for the entire unit. Originally the forks were made from steel weldments. They were redesigned to high strength gray iron castings. This reduced manufacturing operations from nine to three, and cut fabricating costs by over 29%. This is just another example of how modern iron castings can solve many of the problems of industrial design and at the same time effect substantial manufacturing savings.

For the production of structurally sound iron castings, Hanna Furnace provides foundries with all regular grades of pig iron . . . foundry, malleable, Bessemer, intermediate low phosphorous, as well as HANNA-TITE® and Hanna Silvery.

Facts from the files of Gray Iron Founders' Society

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THE BEST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
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Circle 648 on Page 53

In the interest of the American foundry industry, this ad (see opposite page) will also appear in

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ings, unit cost of which, when the cost of the pattern plate and the whole rigamarole of core plugs, boxes, and whathaveyou had been absorbed, literally scared the britches off me. The pattern price I hinted at during our first get-together turned out to be closer to reality than the one arrived at by researching the log book, and my prospects never batted an eye when I hinted at it. Yet, like a boob, in fear and trembling I slashed the living daylights out of my pattern cost estimate. The job's almost finished now, and it's going to be a good job. I know my people are going to like it.

I feel even more foolish now, at this late date, realizing that the foundry which made my sample castings must have had to go through all that we have gone through when it made the original lot. And I wouldn't be surprised to know that I may appear just a bit foolish to my clients, with my ridiculously low bid, in the light of what they must have paid for their original lot of castings. Well, we live and learn, I hope.

Playing by Ear—In view of all this, I begin to suspect that even the best detailed creeds or formulas for costing in a jobbing foundry like ours cannot be followed to the letter of the law. There's that prophecy factor needed in dealing with prospective jobs that have little in common with past jobs. With all due respect for digital logic, estimating in brand new fields has to be played by ear, sort of. And it's amazing how accurately the player by ear, after years of experience, can hit the right note—the correct figure—at times, when there's no other way.

I say this because, in spite of my periods of cowardice, and on the basis of feel, without knowing exactly how I do it, I have been surprised at the accuracy of my results. Yet, I've known any number of experienced foundrymen who trim the britches off me in this respect. So let's not thumb our noses at this tediously acquired sixth sense, although at the same time we must recognize digital logic and history as the ordinary ultimate. For Heaven's sake, let my cowardice be a lesson to you. The customer usually will pay if the price is honest and right. And if he won't, we can't use him and stay in business.

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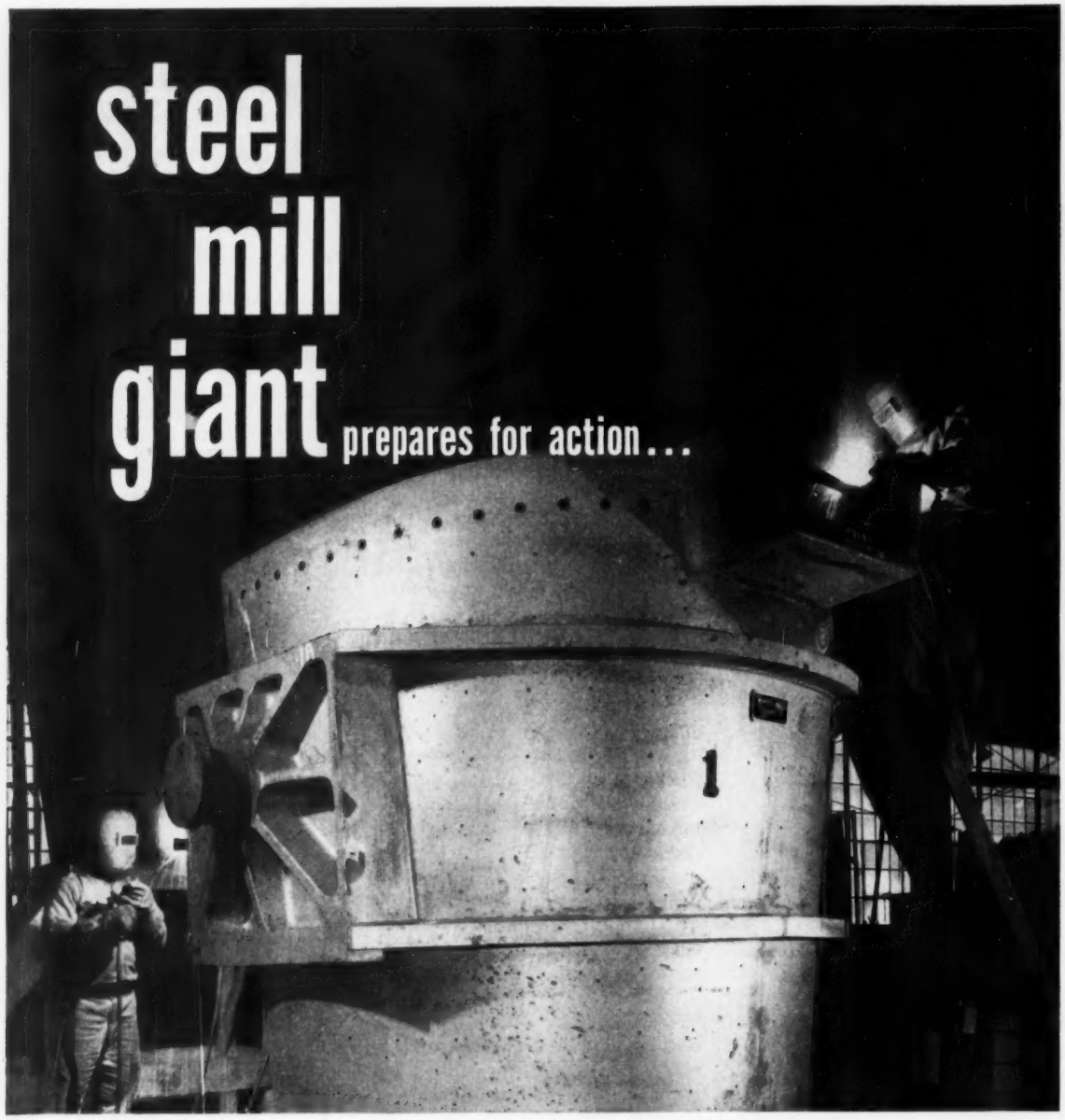
steel mill giant prepares for action...



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WHITING

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

Left to right at the Malleable Founders Society Marketing Conference: Thomas H. Spencer, Caterpillar Tractor Co.; H. M. Kirkby, Marion Malleable Iron Works, program chairman; Kenneth R. Geist, Allis-Chalmers Mfg. Co.; Harold N. Bogart, Ford Motor Co. Messrs. Spencer, Geist, and Bogart were speakers

Malleable Founders Seek
STRONGER MARKETING PROGRAM

By ERLE F. ROSS

● WITH their product facing increasing competition from other types of castings and other forms of fabrication, malleable foundries see the need for broadening and intensifying their marketing programs. This conclusion was brought into sharp focus at the 11th annual Market Development Conference of the Malleable Founders Society at the Edgewater Beach Hotel, Chicago, April 13-14.

This year's conference took a new approach to market development. Preparatory to formulating ideas on what is needed to improve marketing techniques, malleable casting makers listened on the first day to the views of a few users on what they think of the industry and its product. They stuck their necks way out, so to speak, and they found enough frankness forthcoming from the invited speakers to discourage complacency.

On the second day, MFS members analyzed the criticism received and engaged in some serious introspection before plotting the course for "Malleable's Markets in the Soaring 60s."

The conference was opened by H. M. Kirkby, manager of casting sales, Marion Malleable Iron Co., Marion, Ind., and program chairman of the conference. In arranging the program it was the consensus of the committee, he said, that the society should take a long hard look at business prospects for the 1960s to determine what it is going to take to meet the challenge of changing demand.

Business Outlook—In an address titled "The Next Decade," James A. Bourke, vice president and economist, First National Bank, Chicago, presented his views on the course of business at both short and long range. Statistics show, he said, that of total purchases of goods and services, consumers account for 65 per cent, government 20 per cent, and business 15 per cent.

As to the immediate future, Mr. Bourke sees prices holding reasonably stable, new high business levels this year with gross national product amounting to $510 billion for a 4 per cent gain, and plant and equipment expenditures aggregating $37 billion, up 14 per cent over 1959. Consumers are indicating more interest than a year ago in buying goods, and construction will slightly exceed 1959.

During this decade, Mr. Bourke estimates automobile sales will reach 8 million by 1965 and 10 mil-

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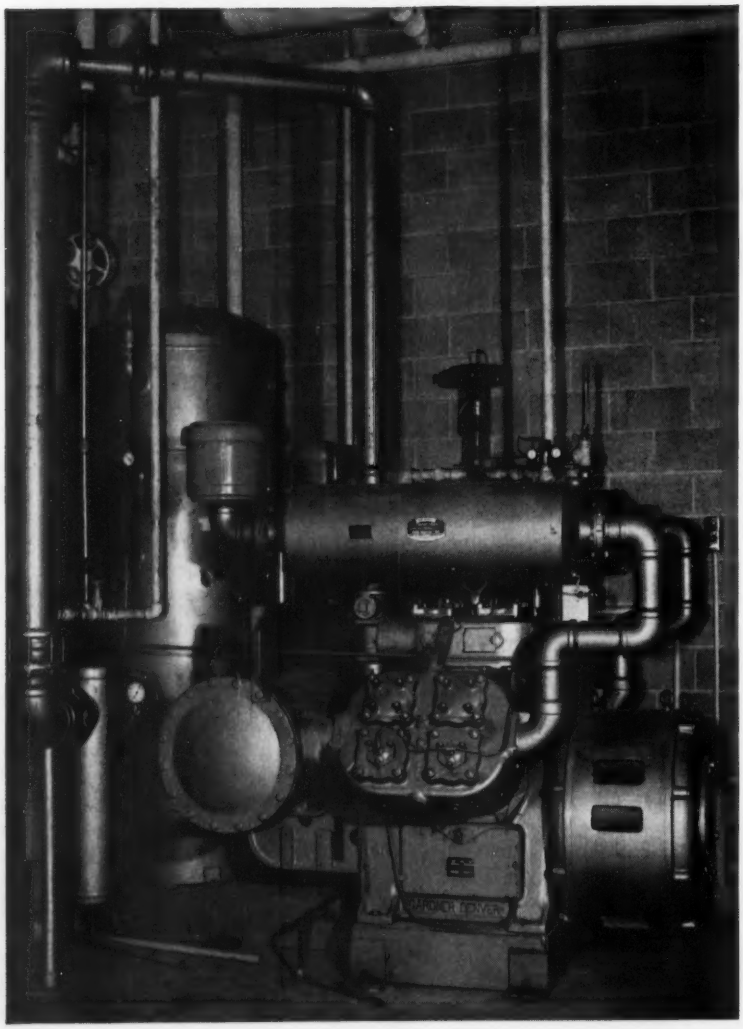


lion by 1970; business growth will equal that of the last 25 years; and expenditures for scientific research, which amounted to $60 billion in the last decade, will double. By 1975, it is predicted population will grow to 225 million versus the present 185 million.

Buying Practice — First user to present his views on malleable castings and purchasing practices was Kenneth R. Geist, purchasing director, Allis-Chalmers Mfg. Co., Milwaukee. His comments covered blanket orders and releases, value analysis, and materials management.

He advocated the practice of placing an order to cover a year's requirements with periodic releases. These orders do not specify any particular quantities for the year, but do release a firm shipping schedule for a definite period of time, a manufacturing release, and authority to purchase material for another definite period. Mr. Geist said that if holdups are necessary and the foundry books new business to take up the slack, his company expects that the foundry will not allow the new business to interfere with the original order when shipments are reinstated.

Under the philosophy of value analysis, the future of a part that is a malleable casting is not necessarily secure if it can be replaced adequately and be made for less cost. There is a tendency for salesmen to take orders and then to forget about them. Salesmen should follow through, Mr. Geist maintained, so that the buyer should never need to expedite.

Among shortcomings of the malleable industry is pricing, he said. Flat price increases will be resisted because all castings are not subject to the same increases in costs. Each casting must be analyzed and priced accordingly. Engineers, designers, and purchasing agents are not being educated on the merits of malleable castings, Mr. Geist maintained.

Casting Quality—"The Problem of Quality" was discussed by Thomas H. Spencer, quality control manager, Caterpillar Tractor Co., Peoria, Ill. This was the summary of a conference which the company held last fall of all its malleable suppliers. The most practical way to

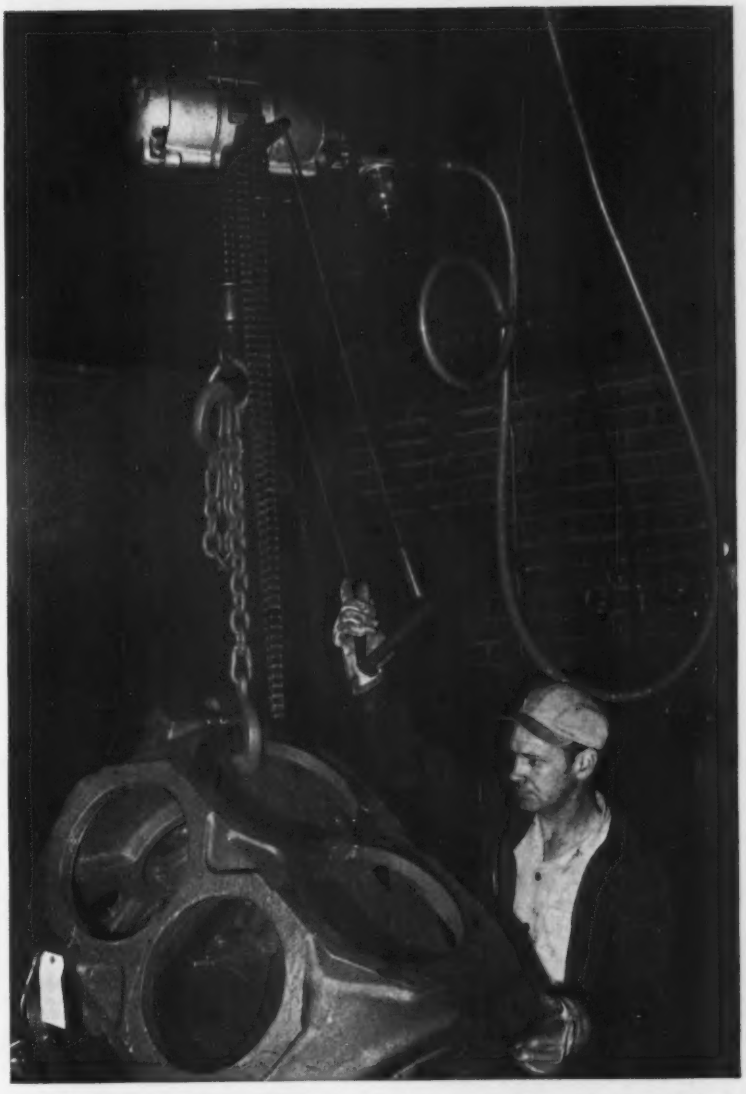
keep a customer, he emphasized, is to sell him a quality product.

The Caterpillar study covered a full year during which time 3.3 per cent of the castings received were rejected. Most trouble arises from relatively few problems, he stated. For example, cracks accounted for 22.7 per cent; improper grinding, 10.6; shrinks, 10.3; blows, 10.1; and excess metal, 8.2 per cent. Mr. Spencer pointed out that malleable's principal competition is high-strength gray iron, nodular iron, cast steel, and steel fabrication.

Trends in Metals — Working against expanded use of malleable iron is the trend toward incorporation of aluminum in automobiles, said Harold N. Bogart, manager, process development, manufacturing research, Ford Motor Co., Dearborn, Mich., in discussing "Materials, Machining and Malleable." Machining reduction is eagerly sought and can be achieved only by producing castings to increasingly closer tolerances, he pointed out. These more precise dimensions are foreseen through more careful maintenance of molding equipment as well as devising foundry manufacturing methods with inherently less variable dimensional allowances.

The key in reducing machining costs is uniformity of over-all structure; of graphite size, shape and distribution; of matrix structure; of metal soundness; and of surface. A second continuing need in the automobile industry, Mr. Bogart continued, is for components able to meet current engineering requirements at a reduced weight. A third need is for castings with improved finish, and a fourth is for increased and guaranteed part reliability. A fifth, and by no means least, important need is a reduction in the foundry tooling cost.

Mr. Bogart said in general the malleable industry may not be geared to respond to the pressure of the automobile industry. He complimented the industry on its accomplishments in the chemistry and metallurgy of the malleable irons and its leadership in adopting modern heat treating techniques. But, he continued, it is not sufficiently sensitive to automotive industry objectives. As fertile areas for development, he mentioned an increase in the strength-to-weight ratio and an improvement in wear resistance



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ABCO ALUMINUM & BRASS WORKS, Houston, Texas, finds that PETRO BOND molding sands meet all requirements for precision castings. Pictured here is an aluminum dry air heater coil cast in PETRO BOND sand.

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—two fields in which malleable iron already has made major contributions.

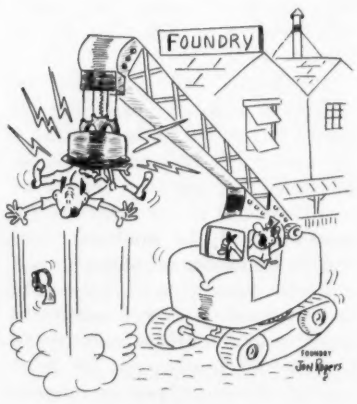
Edward M. Walther, senior partner, Management Development Associates, New York, presented a stimulating demonstration of concepts and motivations of executives and managers in running their business in a "crisis-ridden world."

First day's program concluded with a panel consisting of Messrs. Geist, Spencer, Bogart, and Walther, answering questions arising from their addresses. Moderator was George F. Sullivan, editor, *Iron Age*, Philadelphia.

Executive's Viewpoint—The second day's program started out with John A. Wagner, president, Wagner Malleable Iron Co., Decatur, Ill., expressing the executive's viewpoint on the "Outlook for Malleable's Markets." He commented that criticism of the malleable industry, such as was heard on the previous day, stemmed from neglect at the top management level and emphasized that solutions will have to come from that point.

Referring to Mr. Geist's remarks, Mr. Wagner made it clear that in the purchasing of castings, or any other commodities, price always is the consideration. The point isn't selling for less, but producing for less. He made it clear too that when a buyer of castings finds it necessary to issue holdup instructions, the foundry should be permitted to ship whatever castings have been made and finished under the order.

Malleable producers cannot take



"Stop walkin' by here with your pockets full of tools!"

offense at what Mr. Spencer said concerning the need for better quality control, the speaker continued. With diligence and closer attention to procedures, foundries can not only improve their castings, but also reduce scrap and cut costs. As to the criticism that foundries are unable to produce malleable castings as large as the customer would like, Mr. Wagner admitted that foundries do find this to be a problem, since malleable adapts itself best to the smaller sizes.

Referring to Mr. Bogart's statement that there is some substituting of aluminum for malleable, Mr. Wagner emphasized that parts that should be made in malleable should be kept in malleable iron. The problem of pearlitic rims in malleable castings won't be solved, he said, until the industry gets better heat treating equipment.

For expanded markets, Mr. Wagner believes the malleable iron industry must make a big outlay in heat treating facilities, because superior heat treating equipment is a requisite to producing superior quality castings. But despite criticism, he feels the industry has a good product to offer and has done a good job in supplying it. To continue making a good product requires constantly maintaining control of all foundry operations.

Sales Programs—The need for a united industry sales program was emphasized by John R. Entenmann, assistant sales manager, Northern Malleable Iron Co., St. Paul, in speaking on the "Outlook for Malleable's Markets" from the sales department point of view. The program should embrace action that will provide immediate remedy for whatever shortcomings the industry's product may have currently. In recommending intensified conversion selling, he asserted that the true competitors of malleable iron castings are weldments, forgings, aluminum, and the like.

Buford M. Appleman, service manager, Texas Foundries Inc., Lufkin, Tex., discussed a new concept of customer service by describing in some detail how his company's sales service department functions. Through an analysis of its records, the company determined that over half of all customers contribute less than 5 per cent of the total profit; over half of the jobs

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ABCO ALUMINUM & BRASS WORKS, Houston, Texas, cast this heater coil from manganese bronze, using PETRO BOND sand. Note the smooth surface, the faithful pattern reproduction, the absence of porosity.

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Pennsylvanian Foundry Supply & Sand Co., Philadelphia, Pennsylvania
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run per week contribute less than 5 per cent of the total scrap; and over half of the patterns in the vault contribute less than 5 per cent of the total tonnage.

It was revealed also that 15 per cent of the customers contribute 75 to 80 per cent of total variable profit; 15 per cent of the jobs run per week result in 75 to 80 per cent of all scrap; and 15 per cent of customers' patterns produce 75 to 80 per cent of total tonnage.

The foregoing figures permit the drawing of what is known as a Pareto curve, which is useful in telling where to concentrate efforts to produce better castings. Mr. Appleman explained that the use of such a tool will reduce production costs because the company knows which type of customers provide the bulk of the profit, and this leads to selective selling. Furthermore, the speaker said, use of the sales analyses in the manner described enables a foundry to take advantage of that type of production at which it excels. At Texas Foundries the sales service department serves as a co-ordinator of production control and quality control.

Trend to Aluminum—The "Challenge of Change" was commented on by Carl A. Koerner, manufacturing manager, Central Foundry Div., General Motors Corp., Saginaw, Mich. The corporation could foresee four or five years ago the drop in its future requirements for gray iron castings and the increasing demand for aluminum castings. As a consequence, Central Foundry Div. is about to start pouring aluminum at its Defiance, Ohio, plant which formerly was devoted exclusively to gray iron and malleable.

Production of aluminum castings also will be increased at the division's Fabricast plants in Bedford, Ind., and Malvern, Ark. In 1961, Mr. Koerner said, General Motors will be producing greatly reduced tonnage of gray iron.

The automotive industry has got to find new methods to produce better and more complicated castings, he said. He expressed confidence, however, that the malleable industry has the ability to change and grow with the automobile industry.

Quality Requirements—Speaking on the technical outlook for malleable castings, Hans J. Heine, tech-

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nical director of the Malleable Founders' Society, Cleveland, posed the question of what will be required to improve the product. Quality control had been mentioned by most speakers, and he said it is imperative to have such control.

As to tolerances, the limits for which are constantly narrowing, Mr. Heine asserted that foundrymen don't use all the information they have for producing castings. He mentioned gating and risering as an example. Maybe, he speculated, technical information isn't presented so that it is comprehensive, and maybe the information isn't applicable across the board, but it can be adapted.

Mr. Heine ventured that the foundry industry probably isn't doing as much research as it should, both of fundamental character and on foundry operations. Market development is just as important as research. Need also, the speaker said in closing, are more feasibility studies and a great deal more educational effort on the use of malleable castings.

In bringing the conference to a close, Lowell D. Ryan, executive vice president of the Malleable Founders Society, contributed remarks dealing with more effective marketing. There will be an enormous increase in imports and exports in the 1960s and they can't help but affect malleable castings. They are not important today, but undoubtedly will become so.

Insofar as exports are concerned, Mr. Ryan suggested that malleable foundries probably will do best with products which incorporate malleable castings and which are complete in themselves, such as pumps, auto jacks, etc.

Contest Winners—Announced at the conference dinner were the winners in the third MFS Redesign and Conversion Contest. They are as follows: First prize ($100)—Joseph W. Beckham, Texas Foundries Inc., Lufkin, Tex.; second prize ($50)—Paul Potter, Central Foundry Division, General Motors Corp., Saginaw, Mich.; third prize ($20)—John R. Entenmann, Northern Malleable Iron Co., St. Paul; fourth prize ($10)—Richard Calhan, Dalton Foundries Inc., Warsaw, Ind.; and fifth prize ($10)—Richard Gutenkunst, Milwaukee Malleable & Grey Iron Works Inc., Milwaukee.

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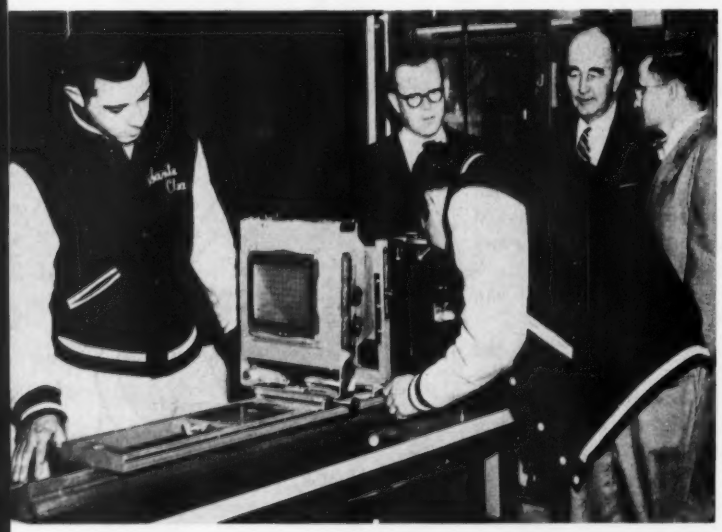
News Views



GIFT METALLOGRAPH: Graduate engineering students at Santa Clara University, Santa Clara, Calif., now are using a metallograph which saw 20 years of service in General Electric Co. laboratories. The instrument is used to study properties of metals

FOUNDRYMAN HONORED: To honor his 50th anniversary in the foundry industry, Dominic Meaglia, president, American Foundry, Los Angeles, received this scroll from Frank Bonelli, chairman, Los Angeles Board of Supervisors. Mr. Meaglia started American Foundry in 1920. It now has 200 employees.

APPRENTICESHIP TROPHY: Leslie Durbin, English craftsman, builds up the model for a trophy to be awarded to the winner of the European Foundry Apprentice Competition. Apprentices representing the foundry industry of all of western Europe competed for the trophy, which was cast in bronze.

INDIA TRADE FAIR: Induction heating demonstrations at the U. S. Small Industries Exhibit in Bombay, India, recently attracted capacity crowds. This demonstrator is explaining induction heating principles using a Model 50 generator supplied by Induction Heating Corp., Brooklyn, N. Y.

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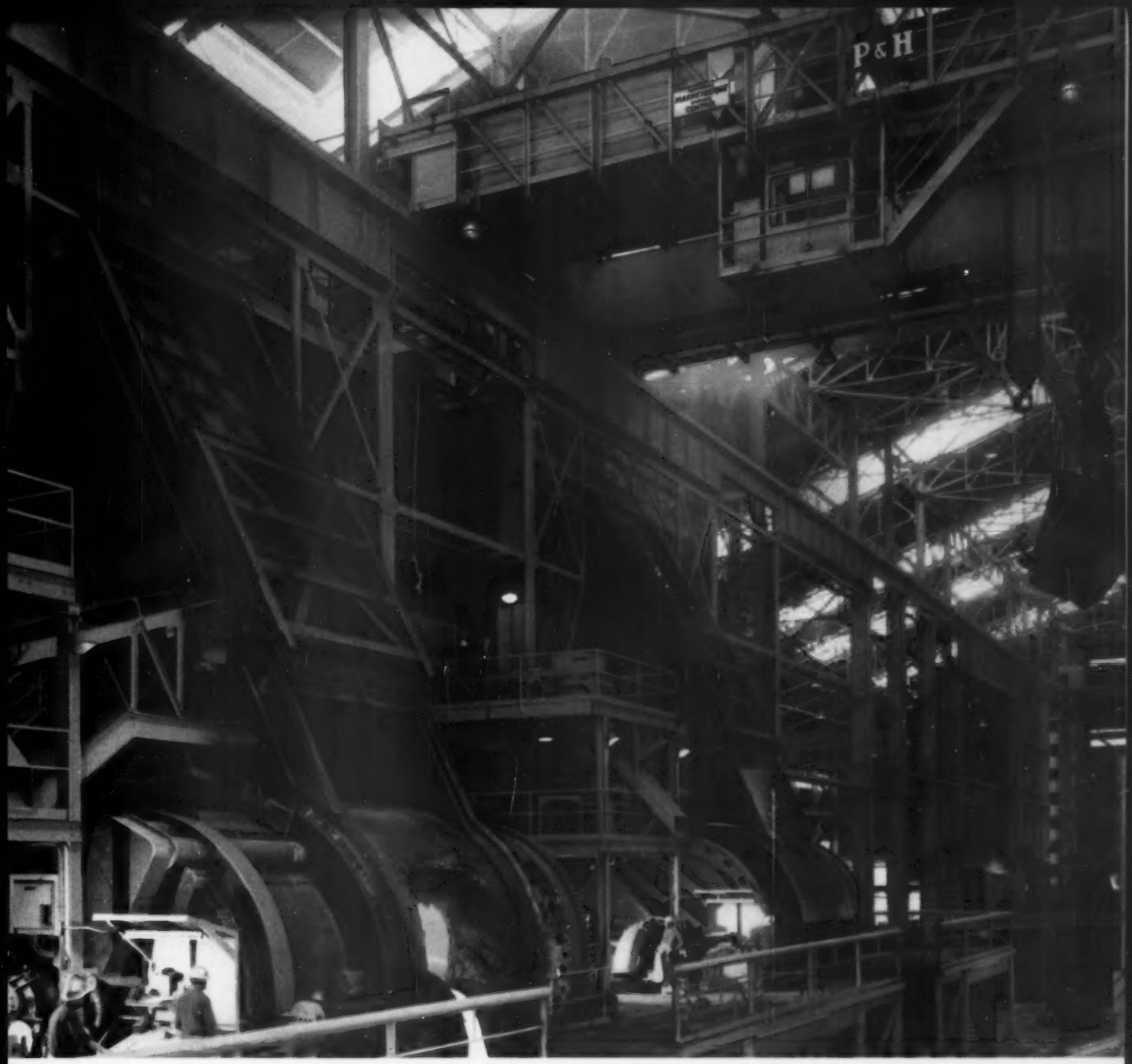

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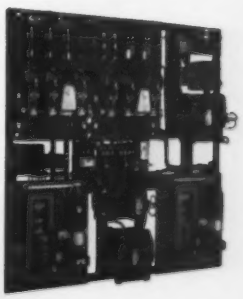

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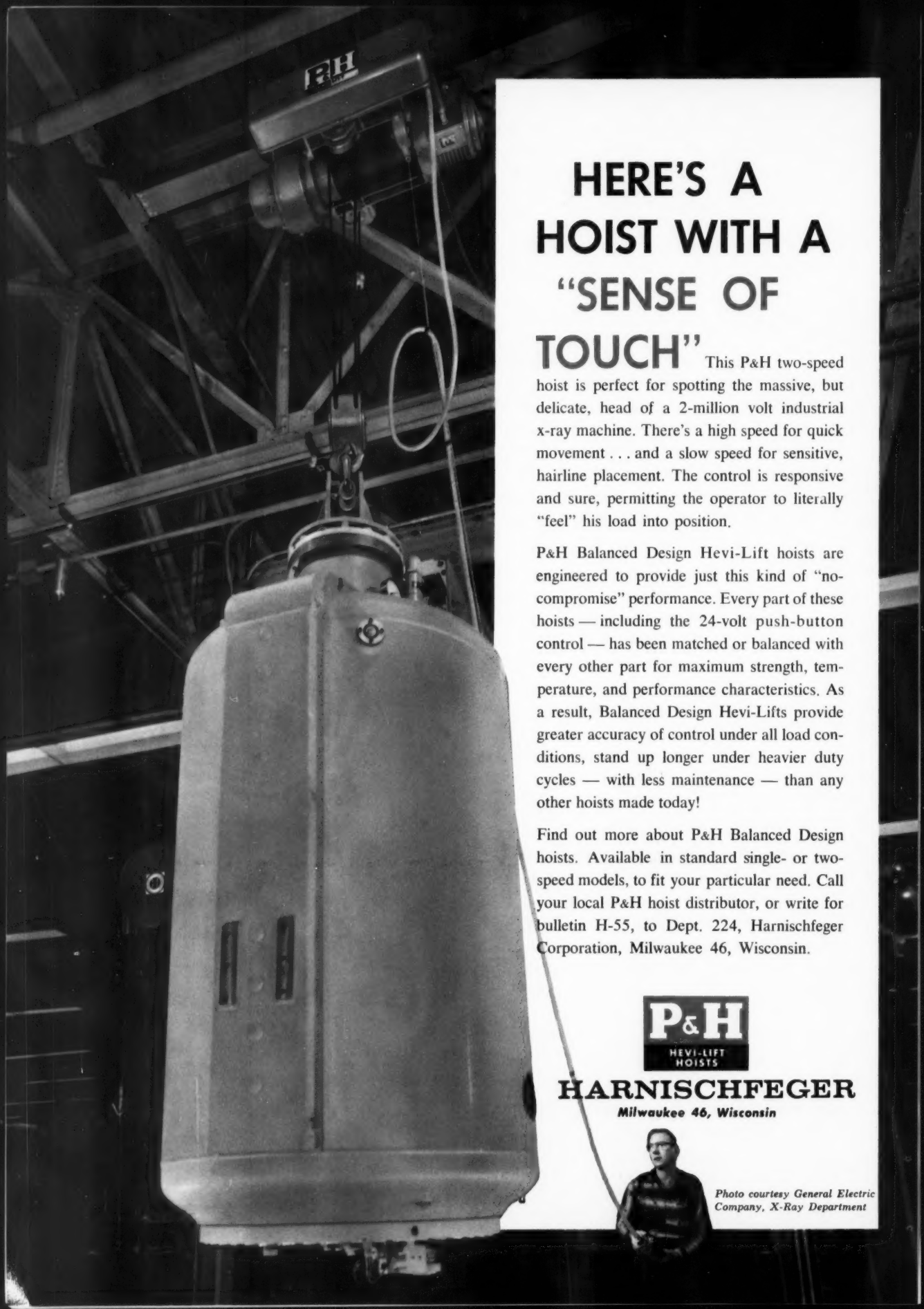

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HARNISCHFEGER
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NEWS REPORTS FROM

Boston . . . Philadelphia . . . Chicago . . . Pittsburgh

Pittsburgh—Foundry sales are following the downward trend of steelmaking operations. Shipments still are at a fairly good level, but there has been a sharp decline in order entry. As a result, backlogs are only a fraction of what they were two months ago. With few exceptions, the third quarter outlook is not bright.

One of the district's largest gray iron foundries has seen its operations drop 20 points since March. During the first quarter, it produced consistently at 75 to 80 per cent of capacity, with most of its output going to the steel mills for maintenance and repair purposes. Now it's running only four days a week, with production at 55 per cent. "We have a small backlog in castings weighing 40,000 lb or more," a sales executive comments, "but next to nothing in the 200 to 15,000-lb range."

Rollmakers and ingot mold manufacturers also have felt the impact of steel production cutbacks. Backlogs mounted during the first quarter and hit a peak in early April, but they've been declining ever since. Although it still has enough business on its books for "several months," a major roll producer is apprehensive about the second half.

Railroad suppliers had an excellent first quarter and booked enough business to keep busy through June. Shipments have been close to capacity since the first of the year, but will decline moderately this month. Although the railroads haven't canceled any of their carbuilding programs, they have not ordered as many cars as their suppliers expected. They're buying very few castings now and probably won't come into the market with big orders until the end of the year, when they'll be buying for 1961. Foundrymen complain that they're being forced to sell railroad castings at 1957 prices.

Although it reported a 10 per cent gain in first quarter sales (vs those of the first quarter, 1959), a leading gray iron foundry had smaller profits for the period. Reasons: 1. Labor costs went up without compensating price increases. 2. Competition was so keen that prices deteriorated.

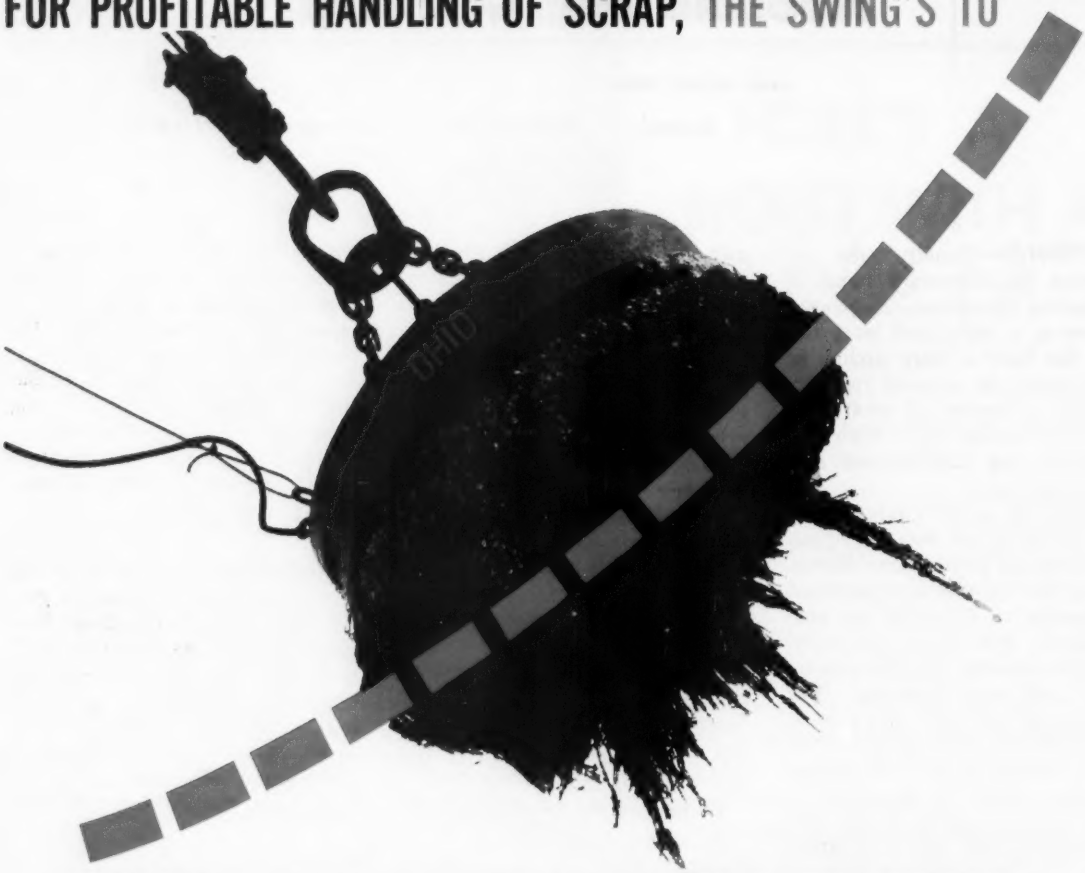
Southern foundries are stepping up their solicitation of business here — offering to sell castings at 16 cents a pound or less, regardless of type. Local foundrymen say competition on machine castings isn't serious, but they admit it's a problem when they're bidding on cheap castings for the highway department. Because of their lower labor costs, foundries in Tennessee and Georgia can absorb high freight and still undersell Pittsburgh producers.

In spite of the generally somber outlook here, there are bright spots. Cases in point: 1. A gray iron job shop is operating at 80 per cent of capacity, has a 30 day backlog ("the largest we've had in quite a while"), and says prices are firm. 2. A machinery builder reports that big foundries are taking the dip in stride, going ahead with plans to install automatic equipment that will cut labor costs.

Boston—Backlogs are small and lead-time schedules shorter at gray iron and malleable foundries. New England shops are operating at 70 to 75 per cent of capacity with incoming orders for castings spasmodic, usually accompanied with pressure for prompt delivery. A few foundries, making malleable and textile mill equipment, are melting somewhat

SAFETY CONTEST: Winning entries in a safety poster contest sponsored by Steel Founders' Society Contest will be used to promote the society's 14th annual safety contest during June, July, and August. The contest was open to employees of member foundries, and winning ideas were submitted by Dale L. Hall, Charles LeMaster, and Lester O'Brien, all of Oklahoma Steel Castings Co., and W. J. Tilton, National Malleable & Steel Castings Co., Melrose Park, Ill. Judges were members of the SFSA National Safety Committee. Seated, left to right: James B. Holtzapple, Blaw-Knox Co., chairman; H. E. Wheeler, Alloy Steel & Metals Co.; R. E. Walther, Dayton Steel Foundry Co.; and R. A. Willey, SFSA. Standing, left to right, H. A. Worrell, National Malleable & Steel Castings Co., Melrose Park; T. H. Shartle Jr., Texas Electric Steel Casting Co.; R. F. Crawford, Mackintosh-Hemphill Div., E. W. Bliss Co.; R. E. Rosien, Eastern Malleable Iron Co. H. L. Farthing, Sterling Steel Casting Co., was not present for the picture

FOR PROFITABLE HANDLING OF SCRAP, THE SWING'S TO



OHIO *lightweight* MAGNETS

- **Get faster operation**
- **Work over wider radius**
- **Cut wear and tear on crane**

With today's squeeze on profits, you can't afford to neglect any phase of your operations. And proper magnetic handling of scrap is one operation that you can control . . . can make pay off.

The best way is to specify Ohio Lightweight Scrap Handling Magnets. The 61″ model easily outperforms conventional magnets of greater diameter on deep-drawing material such as punchings, turnings, etc.

So give a lift to your profits—with Ohio Lightweight Scrap Handling Magnets. A-903A

Howell makes electric motors up to 300 HP for use in your yard.

Ohio 61″ lightweight, waterproof, aluminum-wound lifting magnet (above) weighs only 6750 lbs., lightest for its size known to industry—yet without sacrificing any of Ohio's famous rugged welded construction. Readily replaceable bolted pole shoe. Other Ohio lightweight welded magnets available; in 39, 45 and 55″ sizes with Protecto-Weld feature.

THE OHIO ELECTRIC MFG. CO.

5400 DUNHAM RD., MAPLE HEIGHTS, OHIO

A Subsidiary of Howell Electric Motors Company

ohio ELECTRIC

Circle 659 on Page 53

above the average, maintaining June schedules at the May rate, but eating into their backlogs.

Machine tool volume is a trifle heavier (most buy castings) and one large integrated Connecticut shop has booked orders for heavy castings—large valves and oil drilling equipment, jobbing tonnage.

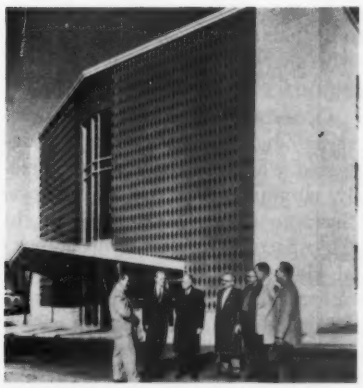
Consumer stocks of iron castings are low—they are not buying far ahead—and second half volume with foundries is likely to top that of the first six months; earlier predictions that 1960 tonnage would exceed 1959 by 10 per cent may well prove true. Some shops will close the first six months by that margin, especially textile casting manufacturers and a few malleable producers.

A slight decline in demand for construction and highway tonnage (manhole covers and drainage) follows the lag in highway contracts, but more work now is being estimated in the six northeastern states. This increase should be reflected in heavier requirements late this year. Several shops are installing new sand preparation and handling equipment, including Whitman Foundry, Inc., Whitman, Mass., and Standard Foundry, Worcester. For reduction of annealing time, several have installed new electric furnaces. Among these are Standard Foundry Co., Worcester, Mass., and Belcher Malleable Iron Co., Easton, Mass.

Competition is putting pressure on casting prices, and an increasing number of foundries have modernization programs, either completed or to be started this year. Most of the newer plants and the textile machinery shops already are highly mechanized.

Bulk of pig iron remaining at Everett, Mass., has been shipped. Mystic Iron Works (which halted production in October, 1959) urged customers to take their share of remaining iron by June 1. Troy, N. Y., now is the basing point, and, with lower freight to most points, the delivered price of No. 2 foundry, to Worcester-Fitchburg, Mass., is $73.68 per gross ton, 50-ton car lots, and $75.25 to Boston and nearby consuming points.

More iron is being stored at Beacon, N. Y., by Buffalo furnaces for shipment to New England, and imported tonnage is also a com-



ALUMINUM SCREEN: At Immanuel Baptist Church, Tulsa, Okla., 480 18 x 24-in. panels of ¼-in. cast Tenzaloy aluminum alloy comprise an architectural screen which shields windows from direct sunlight and is part of the exterior design. Here, the church building committee looks over the finished job. Castings were made by Progressive Brass Mfg. Co., Tulsa. Tenzaloy is produced by the American Smelting & Refining Co., New York

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Standard Equipment for the

STANDARD DRY KILN COMPANY

Exterior and interior view of kiln installed by Standard for the Jennison-Wright Corp. of Toledo, Ohio.

"We use Curtis Compressors in practically every installation," says Mr. R. H. Elliott, Vice President, Standard Dry Kiln Company of Indianapolis. "We've had a great deal of success with them in the last ten years."

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IS YOUR PROBLEM DIFFERENT? It's still a job for Curtis if it calls for a steady, dependable supply of compressed air for mills, plants, factories, or foundries. Compressors have positive pressure lubrication and external adjustable Timken tapered roller main bearings. Tanks meet ASME Specifications.

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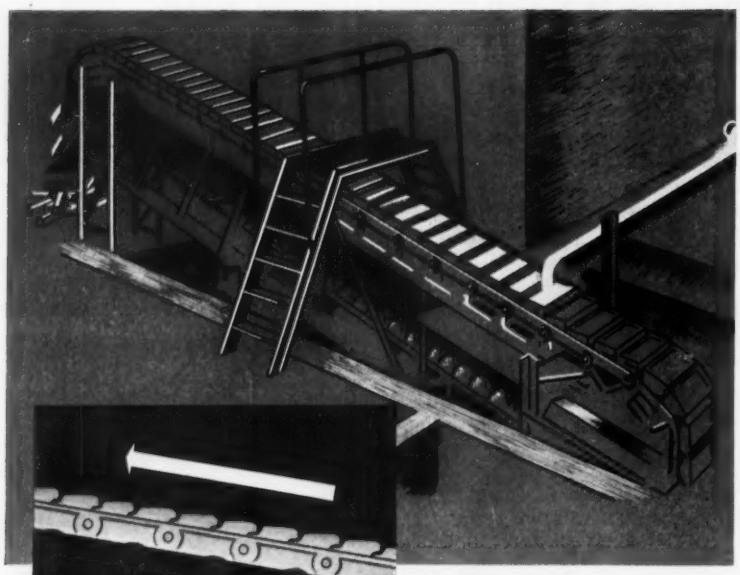

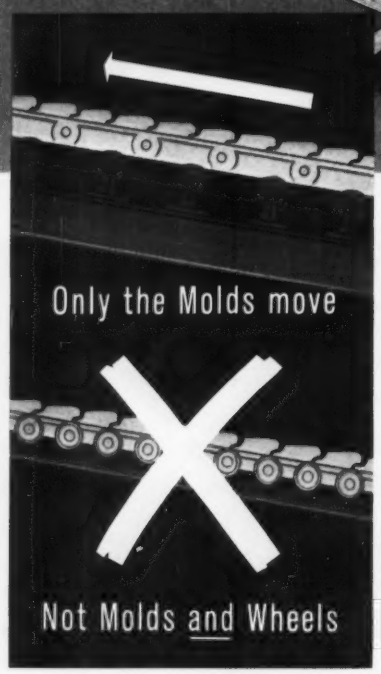

Let
STATIONARY
WHEELS
Reduce your
Pig Casting
Costs

Eliminating 80% of the parts of conventional pig casting machines, this simplified design results in sharp reductions of lost production time and maintenance costs. Since the idler wheels are mounted on anti-friction bearings on the stationary part of the frame, not on the molds, they are positioned as far as possible from hot metal.

Capacities for the machine illustrated: from 3 to 50 tons per hour. Sizes: 15 to 125 feet. Other Bailey Pig Machines are made in single and double strand types and in capacities to 250 tons per hour. Both types feature stationary wheel construction.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD PITTSBURGH 16, PA.

petitive factor. Cast scrap prices are slightly firmer and have not declined as sharply as heavy melting steel grades. In both instances, exports have tended to hold scrap at current levels.

Chapman Valve Mfg. Co., Indian Orchard, Mass., has a $44,832 contract for 20-in. gate valves for the Glen Canyon dam of the Colorado River storage project, and W. S. Rockwell Co., Fairfield, Conn., has a $85,295 contract for a butterfly type valve, with the naval shipyard at Philadelphia.

Brass and aluminum shops note a slight improvement in incoming orders for small valves and fittings. The nonferrous industry is averaging close to 75 per cent of capacity with few exceptions. Boston district brass shops negotiated a two-year labor contract providing for a 15-cent per hour increase—eight cents first year and seven the second. About 35 shops are affected in the Greater Boston area. Others usually follow with separate negotiations, closely following the Boston contract.

Chicago—During periods in which the demand for castings slackens, foundrymen become more conscious of their competitive position. Sometimes it is a matter of competing with other foundries for the going business. But more often it is one metal competing with another metal, or a casting competing with a weldment or some other form of noncast fabrication.

Occasionally, however, some drastic product design change is suggested which partially or completely eliminates the use of castings. Such an example was revealed in Chicago recently when International Harvester Co. announced development of a research tractor by its Engineering Research group which makes use of a hydrostatic transmission.

The foundryman finds no comfort in this research tractor in which "the entire complex of gears, shafts and splines that have always been needed to send power from engine to driving wheels—as well as the big hollow mainframe casting that housed it"—have disappeared.

Depending on oil at high pressure to transmit power by acting on a moving piston, the system devised

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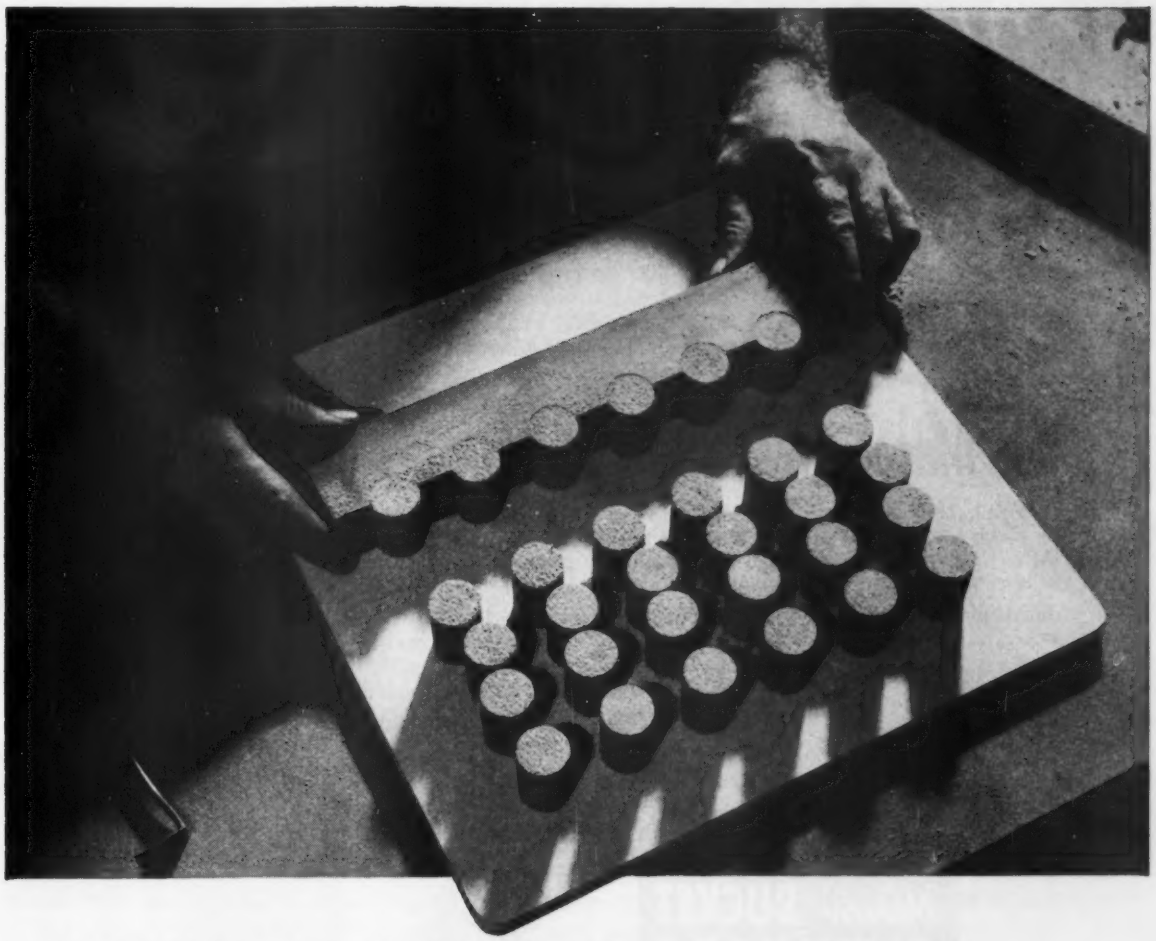


Smoothly sanded Transite Core Plates bring new precision to core production

Tough asbestos-cement composition keeps them true over long service life

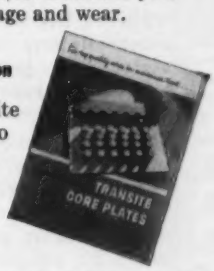
Experienced foundrymen know they can depend on Transite® Core Plates for fast, accurate production of precision cores, day in and day out . . . even under heaviest production schedules.

For toughness and durability, these smoothly sanded boards are fabricated of fibrous asbestos and cement in a special Johns-Manville process. Extremely strong and lightweight, they resist shock and corrosion, will not crack or break under normal use. Boards can be easily cleaned, too.

Transite Core Plates have proved themselves in hundreds of ferrous and non-ferrous foundries all over the country. They maintain their smooth, level surface year after year with a minimum of warpage and wear.

FREE new folder gives complete information

Whether or not you now use Transite Core Plates, there are many gains to be had from a careful study of our new folder IN-219A. It gives complete specification data—weights, sizes, thicknesses. *Send the coupon below.*



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Circle 662 on Page 53

CUT COSTS!

Blast Metal Away with ARCAIR

Here's metal removal to beat anything you've ever seen before! Arcair Torch cuts, gouges, grooves, bevels or flushes off *any* metal . . . does it faster, cheaper, through a revolutionary combination of the electric arc and ordinary compressed air.

Inexpensive to install, economical to operate, easy to use —Arcair works with any standard arc welding machine.

WRITE TODAY FOR COMPLETE INFORMATION!

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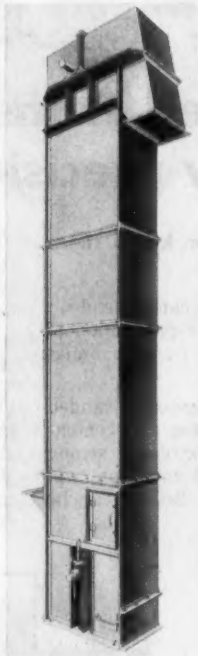
Circle 663 on Page 53

Webster BUCKET ELEVATORS

for *handling* FOUNDRY SAND



WEBSTER Bucket Elevators can be supplied in practically any capacity. Made in centrifugal, perfect or gravity discharge, continuous bucket, and super capacity types. Buckets can be furnished malleable iron, duramal or steel. WEBSTER Conveyors for sand, shot, molds, castings, refuse, etc. are widely specified by foundry engineering consultants and used by specialty equipment manufacturers in foundry mechanization programs. All components of WEBSTER equipment are manufactured and assembled in the Webster plant in Tiffin, Ohio.

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SINCE WM 1876

Offices in all Principal Cities

by IH researchers has three major parts: A pair of radial hydraulic motors—one in each driving wheel —and a variable displacement pump which furnishes pressure energy to the system. The pump is coupled directly to the engine.

Piston action in the motors resembles that of a radial aircraft engine, with oil pressure—replacing combustion and expansion of gases —to move the pistons. The pistons act on an eccentric which serves as a crankshaft, converting hydraulic pressure to torque.

* * *

In July, 1959, an International Trade Fair was held in Chicago to celebrate the opening of the St. Lawrence Seaway and Chicago's emergence as a major world port. It was sponsored by the Chicago Association of Commerce & Industry and was held at Navy Pier. The 16-day event, which attracted close to a million visitors, featured some 500 exhibits of industrial and consumer goods from 65 nations and valued at $34 million.

Prompted by success of the 1959 International Trade Fair, a 1960 fair is being held June 20-July 5. About the same number of countries will be represented, but the value of goods shown will jump to $50 million.

Included in the hard goods lines will be machine tools, hand tools, cutlery, builders hardware, industrial goods, office equipment and business machines, optical goods, and automobiles. Ferrous castings will not be in evidence as such but an inquisitive foundryman will be able to find plenty of them as components in the equipment mentioned. Nonferrous castings and some iron will be conspicuous, however, in brass and bronze and other art work.

Philadelphia— Following a peak in March, and not much of a one at that, casting demand is tapering with the downward trend likely to continue into the summer.

May was off slightly from April, when a downturn was noted, and most casting makers believe that June will witness a further dip, with the summer vacation season getting under way late in the month. The bottom is, however, expected to be reached in July, when summer sea-

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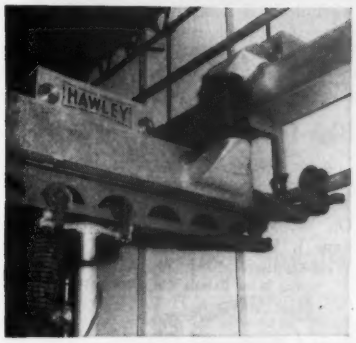

eliminates big, expensive area ventilating systems

exhausts toxic fumes at any pouring point

• *First and only* real solution to non-ferrous foundry ventilating problems. Eliminates "zinc shakes" and other health hazards . . . improves working conditions. Pays for itself in heat saved. *Installs at less* than ⅓ the cost of inefficient, conventional systems . . . uses as little as 1500 cfm. Will fit *your* foundry layout. Write now for complete information . . . or telephone 1300 in Wabash, Indiana.

HAWLEY MANUFACTURING COMPANY
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Circle 665 on Page 53

sonal influences usually have their most pronounced effect.

Gray iron operations are being supported mostly by light and medium work. There is fair business in vacuum pump, chemical equipment, material handling, and power transmission requirements, but no real activity in any line. Job shops still are operating four to five days a week, with restricted working forces. Backlogs range one to three weeks. Pipe operations are lagging, especially for this season of the year.

In the absence of important industrial equipment work, steel casting foundry operations are spotty, averaging, according to one estimate, around 65-70 per cent. Most shops can turn out work in less than five weeks which means they are practically current, considering the processing involved.

Even the malleable shops are not running as actively as they were. They are operating five days a week, but in general with smaller working forces. There is not the pressure for pipe fittings and hardware.

Business in brass and bronze castings is sluggish, this slowness affecting both independent and captive shops. Water meter and plumbing supply needs definitely are off, and there is a lag in industrial valve and electrical equipment requirements. Most shops are operating three to four days a week and even then are laying off men in some instances. Light metal shops are doing better, relatively.

Book Review

Cost Reduction at Work, A Report of Successful Company Practices, paper, 84 pages 6 x 9 in., Management Report 28, published by the American Management Association, 1515 Broadway, New York 36. Price $2.25.

This report is based on material presented at two special 1958 conferences of the Manufacturing Division, AMA. Companies that have reduced their manufacturing cost substantially explain how it was done. Representatives of small, medium, and large companies describe factually such cost cutting tools as systems engineering, work measurement, and value analysis. The report also includes case studies of successful cost reduction.

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It is no longer necessary for you to buy and use general purpose metal abrasives on the basis of claims made by its manufacturers of its performance in other plants.

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The flexibility of our process of making "Malleabrasive"—and it's ours *exclusively* . . . new techniques and specialized equipment new to the metal abrasive industry enable us to make the type of "Malleabrasive" that will do your cleaning job best.

If you are interested in pinpointing maximum cleaning efficiency and lowest blast-cleaning costs in your own plant, "Malleabrasive"—*tailor made for you*—will do both. Write for full information.

THE GLOBE STEEL ABRASIVE CO.
Mansfield, Ohio

Sold by many leading distributors of foundry supplies from coast to coast.

MALLEABRASIVE

Circle 666 on Page 53

Literature for Foundrymen

For More Information Use Reply Card—Page 53

Industrial Tools

Thirty-four page booklet, "The DoAll Story," outlines the company's facilities, including descriptions of local stores.—DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.

For More Details Circle No. 406—Page 53

Infrared Heat Sources

Information on modular oven components incorporating quartz lamps, quartz tubes, or metal rods as sources for infrared heat is featured in Bulletin 59-240.—Fostoria Corp., Infrared Div., Dept. 44, Fostoria, Ohio.

For More Details Circle No. 407—Page 53

Foundry Engineering

Functions and services of the company are outlined in Bulletin 2100, "Answers to Today's Foundry Problems."—Brown Metals Inc., 300 Huron St., Elyria, Ohio.

For More Details Circle No. 408—Page 53

Buckets

Illustrated Catalog 601 covers all types and sizes of Williams clamshell and dragline buckets and stone grabs. Technical data also are presented.—Wellman Engineering Co., 113 St. Clair Ave. N.E., Cleveland 14, Ohio.

For More Details Circle No. 409—Page 53

Industrial Finishes

Booklet describes company's new plant and office facilities.—Tousey Varnish Co., 2500 Eighth Ave., East Moline, Ill.

For More Details Circle No. 410—Page 53

Tooling Plastics

Brochure outlines applications for epoxy resins in a foundry.—Furane Plastics Inc., 4516 Brazil St., Los Angeles 39, Calif.

For More Details Circle No. 411—Page 53

Hoists and Hoist Tractor

Section 87, page 1, describes air-powered Hoistractor, including information on control systems, construction features, and specifications. Section 86, page 71, illustrates and describes rotary hoists, and Section 12-12i gives data on air hoists.—Gardner-Denver Co., 1011 S. Front St., Quincy, Ill.

For More Details Circle No. 412—Page 53

Furnace Charge Material

April, 1960, issue of the company's news bulletin presents complete information on R-N briquettes, an electric furnace charge material. Summaries of operating data are given.—National Carbon Co., division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 413—Page 53

Tractor Shovels

Bulletin 3000 gives illustrations and descriptions of the Michigan line of tractor shovels. Reference sections are devoted to general specifications for each model and to the power train, the hydraulic system, and over-all engineering features.—Construction Machinery Div., Clark Equipment Co., Pipestone Plant, Benton Harbor, Mich.

For More Details Circle No. 414—Page 53

Storage Structures

Bulletin 207-A contains illustrations and information on storage structures. Sizes and capacities are given.—Sprout-Waldron, Publicity Dept., Muncy, Pa.

For More Details Circle No. 415—Page 53

Magnetic Pulleys

Erium-powered permanent magnetic pulleys are covered in Bulletin B-50-1A.—Eriez Mfg. Co., 1945 Grove Dr., Erie 6, Pa.

For More Details Circle No. 416—Page 53

Refractories

Refractories for heat treating furnaces are discussed in Bulletin 100.—Ramtite Co., 2563 W. 18th St., Chicago 8, Ill.

For More Details Circle No. 417—Page 53

Did You Miss These?

Here is a list of popular literature items offered in recent months:

ALUMINUM CASTING ALLOY — Navan Products Inc., El Segundo, Calif. Circle 402, Page 53.

GAMMA RADIOGRAPHY (Bulletin NS-2000)—Nuclear Systems Div., Budd Co., Philadelphia 32, Pa. Circle 403, Page 53.

PATTERN LETTERS—H. P. Maughlin Co., Columbus 8, Ohio. Circle 404, Page 53.

FERROALLOYS ("Vancoram Products")—Vanadium Corp. of America, New York 17, N. Y. Circle 405, Page 53.

Propeller Fans

New line of propeller fans is illustrated in Bulletin A-109E. Bulletin also contains dimensions and ratings of the fans.—Hartzell Propeller Fan Co., Piqua, Ohio.

For More Details Circle No. 418—Page 53

High-Temperature Microscopy

Nine-page reprint presents information on "High-Temperature Microscopy." The article was written by Dr. F. Gabler and Dr. W. Wurz of Vienna, Austria.—William J. Hacker & Co., P. O. Box 646, West Caldwell, N. J.

For More Details Circle No. 419—Page 53

Speed Reducers

Book 2824 provides information on fan-cooled worm gear speed reducers. The 66-page book contains selection data and complete specifications.—Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill.

For More Details Circle No. 420—Page 53

Pneumatic Production Tools

Catalog PT-58A outlines portable pneumatic production tools. Technical data are included, and the tools are illustrated.—Thomas C. Wilson Inc., 21-11 44th Ave., Long Island City 1, N. Y.

For More Details Circle No. 421—Page 53

Vibratory Machines

Bulletin C-42-C gives details of Vibrasheen vibratory machines including illustrations, descriptions, and specifications. Other finishing equipment also is shown.—Almco-Queen Products Div., King-Seeley Corp., Albert Lea, Minn.

For More Details Circle No. 422—Page 53

Core Sand Mixer

Leaflet gives features of Master Mix 100-lb core sand mixer, Model No. 100CS. Complete cycle of the mixer is illustrated.—Gilson Mfg. Co., Oostburg, Wis.

For More Details Circle No. 423—Page 53

Grinders and Sanders

Form JE-2022-A contains illustrations and technical data on 5V air grinders and sanders.—Thor Power Tool Co., Aurora, Ill.

For More Details Circle No. 424—Page 53

Fluid Power Products

Bulletin 601-B illustrates and describes fluid power products including power cylinders, directional air control valves, com-

Good Castings require accurate pouring temperatures

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PYRO LANCE gives instant readings

The self-contained, portable, Pyro Lance Type 2981 with the enclosed, protected type thermocouple is especially suited to temperature measurements of molten brass, bronze, copper, aluminum bronze, magnesium alloys, and any similar metals where temperatures are not over 2300 deg. F. The protected thermocouple, with adjustable angle head, is mounted in the tip of the lance and thus takes temperature readings below the surface of the molten metal, with a true reading unaffected by dross or surface conditions. The enclosed head is protected against flame, fumes, and corrosion, assuring long life in severe service.

Pyro Lance Type 2981 has reading dial in sturdy aluminum handle. Price $97.00. For complete information on various models and prices write for Bulletin 1724.

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Chicago 10, Ill.

Circle 667 on Page 53

pressed air preparation units, and hydraulic presses.—Hannifin Co., division of Parker-Hannifin Corp., 501 S. Wolf Rd., Des Plaines, Ill.

For More Details Circle No. 425—Page 53

Industrial Insulations

Catalog for 1960 contains descriptions and illustrations of industrial insulations. Thermal conductivity charts are included in the 24-page bulletin.—Baldwin-Ehret-Hill Inc., 500 Breunig Ave., Trenton 2, N. J.

For More Details Circle No. 426—Page 53

Motorized Hoist Tractor

Bulletin H63 gives features and specifications for Pull-A-Hoist, a motorized tractor for hoists.—Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.

For More Details Circle No. 427—Page 53

Finishing Machines

Advantages of vibratory finishing machines are outlined in Bulletin 1701. Illustrations are included.—Pangborn Corp., Hagerstown, Md.

For More Details Circle No. 428—Page 53

Refractory Products

Twenty-six new products are described in a technical data folder. Products include carbides, refractories, and ceramics. —Carborundum Co., Dept. B.M.D., Niagara Falls, N. Y.

For More Details Circle No. 429—Page 53

Silicones

Sixteen-page brochure 1-115 contains summaries of the forms, properties, and applications of silicones, including a section on release agents. Business reply cards are provided for more information about

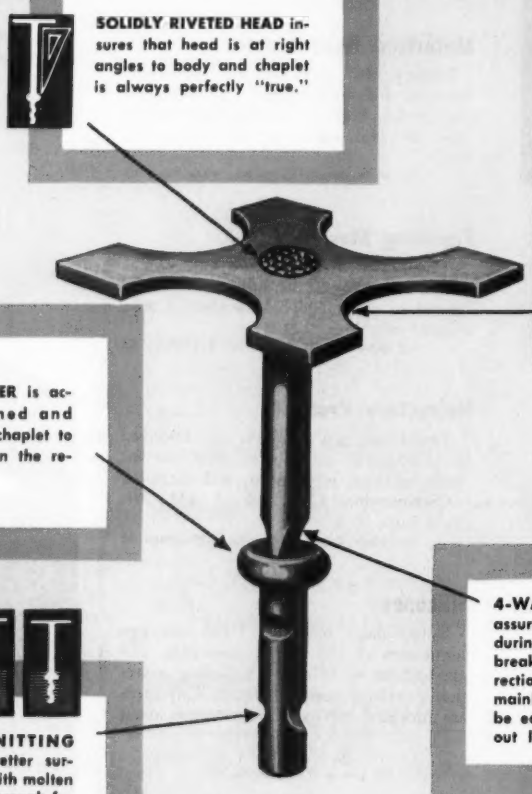
"You suppose it's because I've worked with pig iron so long, Doc?"

increase your odds 8 to 1

SEE NEXT PAGE . . .

fine FANNER RADIATOR CHAPLETS

. . . made in a wide range of types



SOLIDLY RIVETED HEAD insures that head is at right angles to body and chaplet is always perfectly "true."

NO HAND TUCKING. The design eliminates the need for hand "tucking" and permits jolt and squeezer machines to pack sand solidly along entire stem.

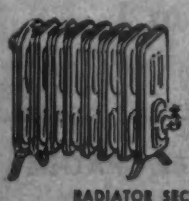
STURDY SHOULDER is accurately designed and placed to permit chaplet to be set into pattern the required distance.

4-WAY BREAKOFF KICK assures maximum support during pouring, yet stems break off easily in any direction so that the few remaining after shake-out can be easily brushed off without leaving surface marks.

STAGGERED KNITTING NICKS provide better surface for knitting with molten metal, assuring thorough fusion and resulting in clean, solid castings.

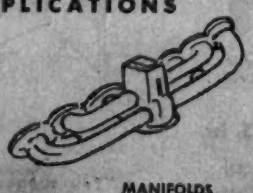
Originally designed for use in the casting of radiator sections, fine FANNER Radiator Chaplets have become so popular that they are now made in eight different types. This is an example of FANNER's policy to provide exactly the right chaplet for every application. Their superior construction gives positive assurance of better casting production at lower overall costs.

TYPICAL APPLICATIONS

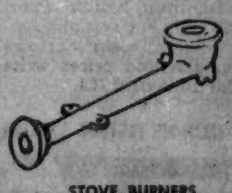


RADIATOR SECTIONS

CYLINDER HEADS



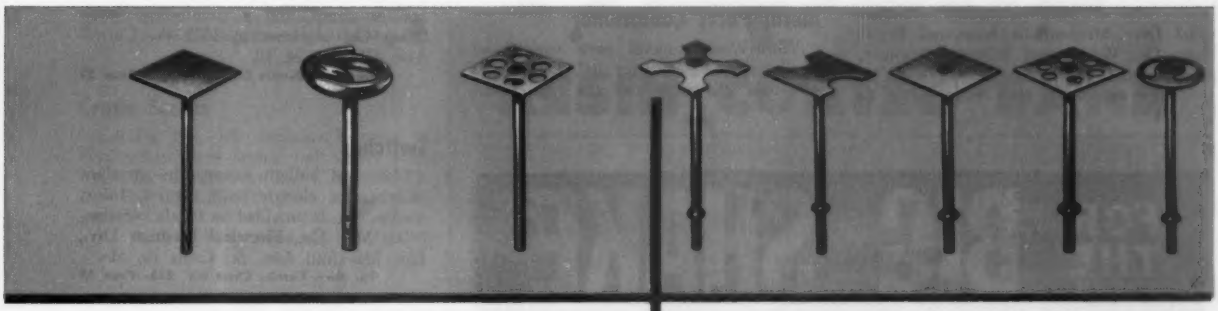
MANIFOLDS



STOVE BURNERS

prove that 8 heads are better than one

that are ideal for LIGHT CORE WORK



STRAIGHT TYPES

PLATE HEAD RADIATOR CHAPLETS

Gauge of Stem — 6 to 16 gauge
Length of Stem — 1" and under
Size of Head — ⅜" to 1¼"

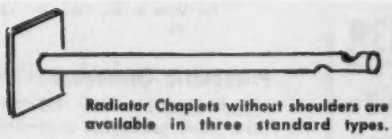
WIRE COIL RADIATOR CHAPLETS

Gauge of Stem — 8 to 16 gauge
Length of Stem — 1" and under

SHOULDER TYPES

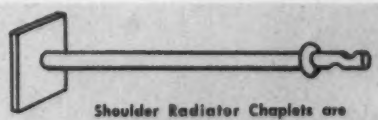
Gauge of Stem — 13 to 16 gauge
Length of Stem — 1" and under to 3"
Size of Head — ⅜" to 1¼"

Other weights and sizes available upon application

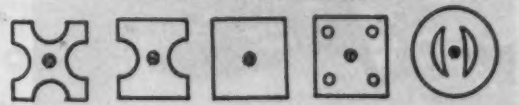


Radiator Chaplets without shoulders are available in three standard types.

Square Head | Coil Head | Perforated Head



Shoulder Radiator Chaplets are available in five standard types.



Cross Head | "H" Type Head | Square Head | Perforated Head | Crescent Head

Fine FANNER Radiator Chaplets are designed for use with the side of the largest bearing surface against the green sand. They will readily support up to five pounds per square inch load. Their special heads, the staggered knitting nicks, the deep "V" break-off nick and solidly riveted heads provide production advantages that result in clean, sound castings in less time and with less effort!

Write for complete chaplet catalog.

THE FANNER MANUFACTURING CO.

Designers and manufacturers of fine FANNER CHAPLETS AND CHILLS

BROOKSIDE PARK **CLEVELAND 9, OHIO**

Circle 668 on Page 53

a specific product. The guide is illustrated with photographs, tables, and graphs.—**Dow Corning Corp.**, 592 Saginaw Rd., Midland, Mich.

For More Details Circle No. 430—Page 53

Thermocouple Assemblies

Forty-page Catalog G100-1 describes thermocouple assemblies in detail including prices, specifications, photos, dimensions, and ordering information.—**Industrial Div., Minneapolis-Honeywell Regulator Co.**, Wayne and Windrim Avenues, Philadelphia 44, Pa.

For More Details Circle No. 431—Page 53

Molybdenum Products

Booklet on Climelt molybdenum and molybdenum-base alloys gives full details on various sizes, forms, conditions of use, tolerances, weights, and methods of identification of Climelt products commercially available. — **Climax Molybdenum Co.**, 1270 Avenue of the Americas, New York 20, N. Y.

For More Details Circle No. 432—Page 53

Metal Parts Conditioner

Vibra-Washer metal parts conditioner is illustrated in Bulletin 107. Folder also describes and illustrates the flight conveyor and the vibrating assembly of the unit and explains applications of the machine.—**Industrial Washer Div., Simplicity Engineering Co.**, Durand 7, Mich.

For More Details Circle No. 433—Page 53

Impregnating Process

Booklet explains the Mogul Impregnating Process and gives information on impregnating units, polymerizing units, a booster pump, and a circulator.—**Metallizing Co. of America**, 3520 W. Carroll Ave., Chicago 24, Ill.

For More Details Circle No. 434—Page 53

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Switches

Illustrated bulletin covers nine pendant switches for electric hoist control. Information also is provided on toggle switches.—**Joy Mfg. Co., Electrical Products Div.**, 1201 Macklind Ave., St. Louis 10, Mo.

For More Details Circle No. 435—Page 53

Heater-Mixer

Bulletin CS-806 illustrates the operating cycle of Mixall heater-mixer.—**C & S Products Co.**, 18656 Fitzpatrick, Detroit 28, Mich.

For More Details Circle No. 436—Page 53

Induction Heating Equipment

Bulletin presents illustrations and descriptions of induction heating equipment.—**Ajax Magnethermic Corp.**, P. O. Box 839, Youngstown 1, Ohio.

For More Details Circle No. 437—Page 53

Pneumatic Conveyors

Eight-page Fact File ER-G-9 discusses three basic pneumatic conveying systems, various component parts, and types of conveying lines, valves, indicators, and controls. The text is illustrated, and a list of materials which can be handled pneumatically is included.—**Fuller Co.**, Catasauqua, Pa.

For More Details Circle No. 438—Page 53

Storage and Shop Equipment

Equiptogram No. 305 contains illustrations and descriptions of steel storage and shop equipment such as shelving, bench units, drawers, and cabinets.—**Equipto Co.**, Aurora, Ill.

For More Details Circle No. 439—Page 53

Air Hoist Components

Illustrated bulletin describes features of air hoist components. Specifications are included.—**Master Pneumatic Tool Co.**, Bedford, Ohio.

For More Details Circle No. 440—Page 53

Plastics and Chemicals

Catalog CDC-370 describes polycarbonate resins, phenolic resins, varnishes and molding powders, and fused magnesium oxide. The 12-page brochure contains

technical information. — General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.

For More Details Circle No. 441—Page 53

Lifting Magnets

Complete data and specifications for lightweight lifting magnets are given in Bulletin No. 3021.—Stearns Magnetic Products, division of Indiana General Corp., 635 S. 28th St., Milwaukee 46, Wis.

For More Details Circle No. 442—Page 53

Crane Scales

Catalog No. 160 explains features of Hydroscale crane scales and shows various uses.—Hydroway Scales Inc., P. O. Box 531 Oakridge Station, Royal Oak, Mich.

For More Details Circle No. 443—Page 53

Sand Conditioning Agents

Technical Bulletin F-12 covers Co-Relees 7300 and Co-Relees 7305 foundry sand conditioning agents. — Reichhold Chemicals Inc., 525 North Broadway, White Plains, N. Y.

For More Details Circle No. 444—Page 53

Welders

Welders are illustrated and described in Bulletin WL. Information on accessories and controls is included.—Miller Electric Mfg. Co., Appleton, Wis.

For More Details Circle No. 445—Page 53

Load Handling Equipment

Major overhead load handling equipment is listed in Bulletin No. 15025-1C-59. Each product in the 20-page catalog is illustrated.—Shaw-Box Crane & Hoist Div., Manning, Maxwell, & Moore Inc., West Broadway Heights, Muskegon, Mich.

For More Details Circle No. 446—Page 53

Fluid Power Equipment

Folder illustrates fluid power equipment and features information on the Air-Draulic cylinder.—Logansport Machine Co., Logansport, Ind.

For More Details Circle No. 447—Page 53

Pot-Type Furnaces

Pot furnaces are described and illustrated in Bulletin IND-635R, which includes technical data.—Hevi-Duty Electric Co., P. O. Box 563, Milwaukee 1, Wis.

For More Details Circle No. 448—Page 53

Lift Truck Accessories

Catalog BU-497 contains information on accessories and optional equipment for fork lift trucks.—Allis-Chalmers Mfg. Co., Engine-Material Handling Div., 1126 S. 70th St., Milwaukee 1, Wis.

For More Details Circle No. 449—Page 53

STEP UP YOUR PRODUCTION OF SHELL CORES AND MOLDS WITH . . .

FASKURE

RESIN COATED SAND

THE FASTEST CURING SAND AVAILABLE

REDUCE YOUR COSTS

- SAVE TIME
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FREE TECHNICAL SERVICE

WRITE FOR BULLETIN 101

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Foundry Supply Co., Minneapolis, Minn.
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FASKURE is a tested, proven product — a combination of our exclusive formulae and processing, backed by years of experience in our own and many other foundries.

QUALITY CONTROL — positive uniformity assured by testing all sand to meet specifications for melt point, tensile strength and rate of shell formation.

FOR MOST FOUNDRIES . . . FASKURE IS LESS EXPENSIVE THAN "MIXING YOUR OWN"— eliminates scrapped cores and castings caused by experimental coating. Saves on equipment costs, floor space and labor.

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AURORA METAL COMPANY
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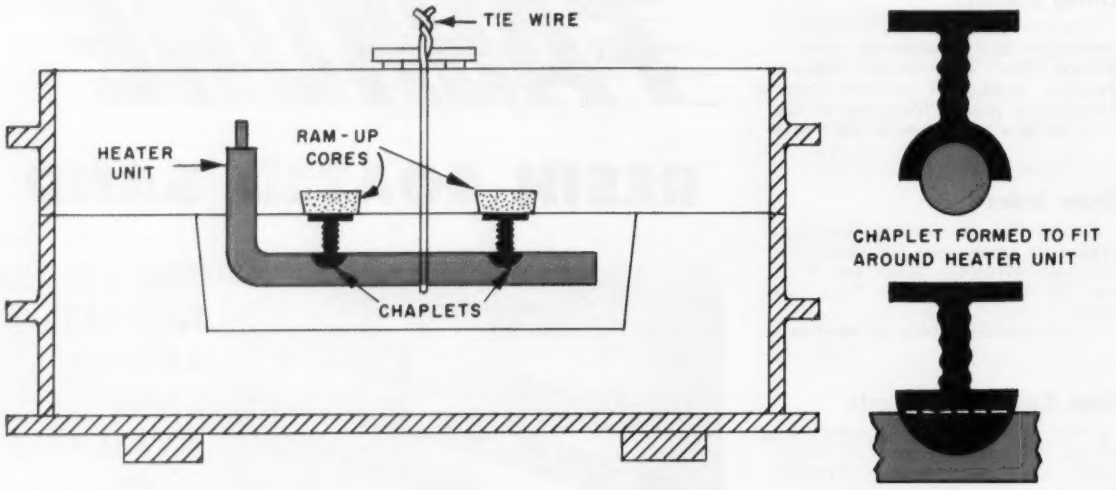
Trouble Shooting

By C. W. AMMEN



Drawings illustrate a successful method of making cast iron heater plates in which heater elements are cast in. Note ram-up cores, which provide a firm footing for the chaplets used to space the heater element halfway into the cavity

Cast-in Heater Elements

Dear Sam:

Our small plant has been having trouble making flat circular cast iron heater plates which have cast-in heater elements. One problem is keeping them in position; another is preventing them from blowing or otherwise not making a good contact with the iron.

Sincerely,
Sam

Dear Sam:

There are a lot of different ways to cast in these heater units and as many ways to coat them to prevent blows, etc. Everything from linseed oil to goose grease has been used. The most successful method I have seen, and actually had my hand in, was used to cast these units in cast iron heater plates for shell core machines.

It used a simple wood pattern, in this instance flat on both sides. The face to be machined was down in the drag. On the cope side were prints to accommodate the terminal ends of the heater units, plus marked-off locations for ram-up cores which went in the cope. They made possible a firm footing for the chaplets used to space the unit halfway into the cavity.

The pattern was placed on a follow board and the drag was rammed up and vented by the usual practice, then was rolled over. After the follow board had been removed, the cope was put in position with the ram-up cores, tie-wire dowels, and loose prints to take the terminal ends of the heater unit. A little facing was riddled on, and the ram-up cores were tucked in place with the fingers. The cope then was rammed up, lifted off, and rolled over on its back on a pair of horses. Double-headed chaplets with one of the heads bent to form a U, which corresponded to the outer diameter of the heater unit legs, were prepared next. The heater unit was sand blasted or otherwise cleaned so as to be completely free from rust and other foreign matter. This step always is extremely important.

The chaplets got the same treatment. Next the chaplets were set in position on the ram-up cores, and the heater unit was placed in position with the terminal ends in their prints. Then the units were tied securely to the cope with soft, clean iron wires. Sand was filled in and tucked tightly around the terminal ends and tie wires to prevent iron from entering and really lousing things up. Finally the entire cope and drag was smoked with an acetylene torch, using a yellow flame and leaving nothing missed—unit, chaplets, tie wires, etc. The molds are left open until they are poured.

Sincerely,
Charlie

➡ *Joy design means:*

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THE MOST EFFICIENT MEANS FOR VARYING FAN OUTPUT

Blade pitch on Joy Axivane Fans can be adjusted very easily. This means that the output of the fans can be varied over a range of ±20% without loss of fan efficiency, and therefore with minimum power consumption. And there are no efficiency losses such as are encountered with dampers and variable inlet vanes. (Where efficiency losses may be tolerated, the volumetric output may be changed by as much as 400%.)

Ventilating system efficiency is increased with Joy vaneaxial type fans, since they maintain the straight-through flow of air. Motors are mounted inside the fans and the fans become part of the ductwork. This direct drive also saves space and installation costs.

Joy Axivane Fans are designed to provide top performance in moving air, particularly where large volumes or high pressures are involved. The adjustable blade feature can save you a great deal of money in situations where the air requirements fluctuate, or are difficult to calculate. For complete details, write for Bulletin 1216-13.

Blade pitch can be adjusted by loosening one nut, re-setting blade to desired position on the calibrated scale, and retightening the nut.

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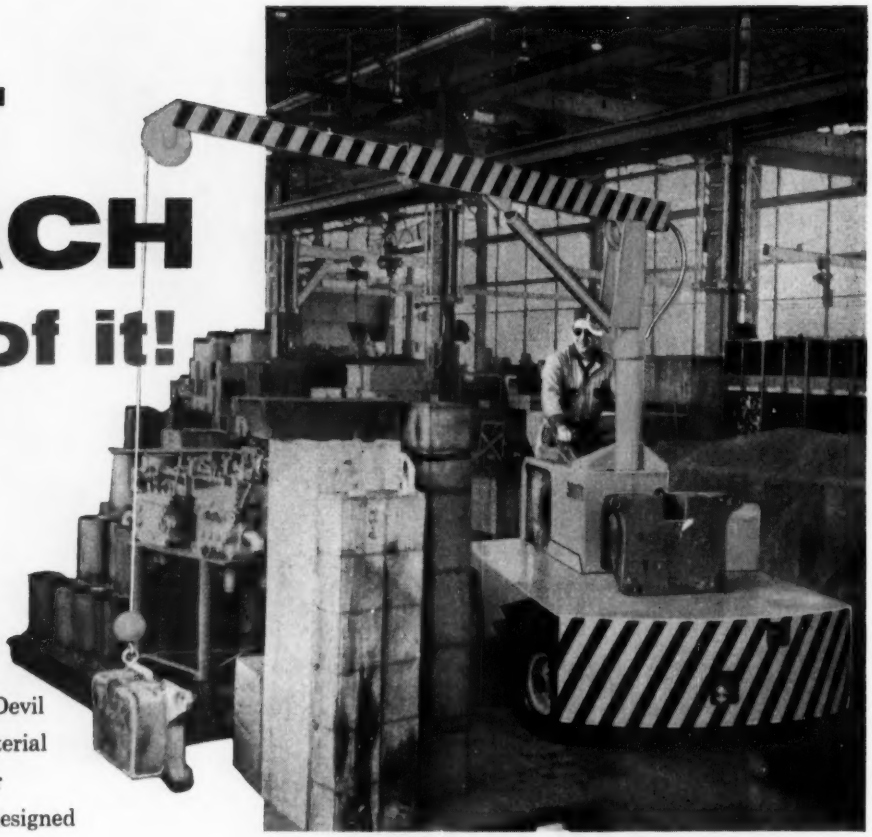
Circle 671 on Page 53

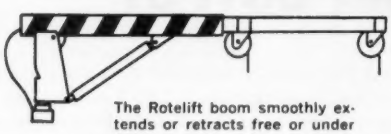
DROTT GO-DEVIL'S

GOT REACH 103″ of it!



Mobility and versatility are combined in the Go-Devil to make hundreds of material handling jobs easier, faster and safer. The uniquely designed and fully maneuverable Rotelift boom makes it as flexible as a giant arm. It lifts, hauls, rotates, extends, and retracts all under smooth, fingertip controlled, hydraulic power.

If you can't afford "second chances" in your materials handling write for your free file size bulletin MH-200 today. It's yours for the asking.



The Rotelift boom smoothly extends or retracts free or under load.

Boom extension is hydraulically controlled by this lever.

Go-Devil's got swing...
360° of it!

Go-Devil's got lift...
15′ of it!

Go-Devil's got haul...
4000 lbs. of it!

DROTT
MANUFACTURING CORP.
Materials Handling Division
Milwaukee, Wisconsin

Circle 672 on Page 53

Casting Practices Discussed at

AFS TECHNICAL SESSIONS

Panel symposium "Ductile Iron Quality Control Methods" was presented at one of the three technical sessions devoted to ductile iron

● A WIDE VARIETY of subjects relating to foundry practice was covered in the nearly 60 sessions making up the technical program of the AFS Castings Congress in Philadelphia.

Some shifts in emphasis on certain topics were evident in the program. Ductile iron received greater attention than in the past, the program including a shop course session. The Diecasting and Permanent Mold Division expanded its program to three sessions plus a joint roundtable luncheon with the Light Metals Division.

The CO_2 process received relatively little coverage, but shell molds and cores were discussed at several sessions. Evening shop courses, devoted to malleable iron, gray iron, sand, and ductile iron, continued to attract interest. Several of these courses were panel discussions which treated more than one subject. The sand shop course, for instance, covered air setting binders and shell molds as well as green sand.

Reflecting increased attention to some of the more technical aspects of castings practice, good attendance marked the fundamental papers sessions and the symposium on solidification of metals.

Summaries are presented on following pages of papers on brass and bronze, light metals, malleable iron, safety and hygiene, management development, ductile iron, plant and plant equipment, and industrial engineering and costs. Reports on other technical sessions will be published next month.

FOUNDRY MANAGEMENT

● PROBLEMS facing industry because of unrealistic regulations affecting depreciation of plant equipment provided the discussion topic for the luncheon session of the Management Development Committee. Ably handling the topic was Richard MacNabb, Machinery and Allied Products Institute, Washington, with L. H. Durdin, Dixie Bronze Co., Birmingham, presiding.

Depreciation allowances are the biggest source of funds for capital investments by industry, more than 50 per cent originating in this manner. At the same time they represent a factor in the cost of doing business. This condition is brought about by the fact that high taxes do not permit sufficient profits to provide the dollars for spending on plant and equipment.

Efficiency Mandatory — A new factor stimulating the need for heavier investment in plant facilities is the necessity to heighten production efficiency in order to meet foreign competition. At the same time, the United States has the most backward system of the world's countries in the matter of depreciation allowance.

Although reforms initiated by the 1954 code provide a more realistic system of depreciation write-off, it does not reflect actual depreciation conditions, partly because of the influence of inflation. The latter factor is costing U. S. industry about $6 billion annually.

Research is speeding the obsolescence of equipment, a trend which will continue; however, the government's useful-life concept of how long a machine should prove useable is based on past experience.

Industry should take advantage of all of the depreciation allowances permitted by present government regulations, but small companies frequently are unable to do so because they lack legal advice.

Reforms needed in the government tax structure related to depreciation allowances could take various directions such as 1) correction of under-depreciation because of inflation, 2) the triple declining balance writeoff, 3) extension of the initial writeoff by elimination of the $10,000 limit, 4) adoption of the class rate (bracket) approach, and 5) reinvestment depreciation.

Liberalization in the regulations incorporating the five-year depreciation allowance in 1954 have now been largely dissipated, although most companies have taken advantage of one or more of the new writeoff methods provided by the 1954 code.

A realistic depreciation system would improve both industrial productivity and earnings of employees, Mr. MacNabb predicted, and adoption of such a system is indispensable to economic growth. The speaker indicated that Congress is becoming more receptive to taking action on the subject.

DUCTILE IRON

● THREE technical sessions and a joint roundtable luncheon meeting with the Gray Iron Division comprised the activities of the AFS Ductile Iron Division. Two of the technical sessions were symposiums. In one, the panel discussed quality control methods and in the second the panel considered various aspects of gating and risering.

The third technical session featured papers on the influence of alloying elements and manufacturing and quality control for shell-molded nodular iron automotive castings. Subject discussed at the roundtable luncheon was scrap metal for iron foundry use.

Symposium: Ductile Iron Quality Control Methods. Panel members were G. F. Thomas, Deere & Co., Moline, Ill.; D. L. Crews, James B. Clow & Sons Inc., Coshocton, Ohio; S. F. Levy, H. P. Deuscher Co., Hamilton, Ohio; and H. W. Ruf, Grede Foundries Inc., Milwaukee.

By way of introduction, Chairman C. K. Donoho, chief metallurgist, American Cast Iron Pipe Co., Birmingham, showed by slides a series of graphite classification charts. Panel members and the audience agreed that the charts constituted a reasonable guide.

Mr. Thomas stated that his company has been producing ductile iron for about 18 months. Inspectors are employed who have no other duties in connection with the quality control department than to observe and check the pouring of ductile iron castings. These inspectors must know the ladle from which every casting is poured. Any change in the graphite structure is reported immediately to metallurgy. Not more than 10 per cent vermicular graphite is permitted. Quality control checks are kept on hardness of the castings.

Mr. Crews explained that his company uses ductile iron in making pipe, and three series of tests are made. These are tests of the metal before the pipe is cast, then tests of the pipe after it is cast, and finally the formal check against specifications by machining test bars from the pipe walls.

Quality control of ductile iron begins with the design of pattern equipment, said Mr. Levy. He observed that pattern equipment is more important with ductile iron than with gray iron. Also, need for effective gating and risering cannot be too strongly emphasized. Close control must be kept over the raw materials, including a close watch for any nonferrous scrap and stainless steel, both of which would be contaminating. Only ductile iron returns are permitted.

Melting is done in an acid-lined cupola, and charging is done by hand. Practice is to pour two ladles of gray iron ahead of ductile iron to get the ladle thoroughly heated. Intricate castings tend to warp during annealing, making it necessary for the castings to be adequately supported in the furnace.

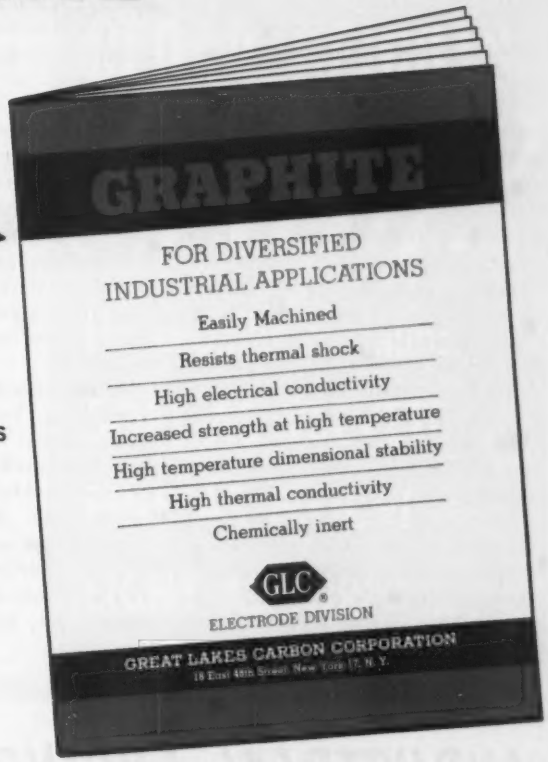
Mr. Ruf, who is chairman of the research committee of the AFS Ductile Iron Division, reviewed some of the work of his committee. One of the problems is how to ascertain if the metal is ductile iron. In its report, the committee has recommended the shape and size of a test coupon regarded as suitable for microscopic examination. Purpose of this coupon is to provide the means for obtaining the graphite classification.

Influence of Nickel up to 37 per cent and Silicon up to 3 per cent on the Eutectic Carbon Content of Cast Iron, by R. D. Schelleng, International Nickel Co., Bayonne, N. J. The eutectic carbon content of cast iron decreases with increasing nickel content. It also decreases as silicon content goes up. These are straight line functions from which the following formula was derived: Carbon eutectic content = $4.3 - 0.50\ Si - 0.047\ Ni + 0.006\ Ni\ Si$.

Discussion brought out the fact that sulfur content of the iron was 0.02-0.03 per cent before treatment and 0.01 per cent after treatment with magnesium. Phosphorus content was 0.015 per cent. Irons containing over 25 per cent nickel have low thermal expansion and are used in castings for applications requiring resistance to heat.

Manufacture and Quality Control Methods for Shell Molded Nodular Iron Castings at Ford Motor Co., by H. C. Grant and A. A. Adams, Ford Motor Co., Dearborn, Mich. Presented by Mr. Adams. Details of the foundry's program of quality control over all incoming materials and products in process

LET US SEND YOU THIS INFORMATIVE BROCHURE ABOUT GRAPHITE



Graphite has a unique combination of physical and chemical properties. Its industrial applications are highly important and greatly diversified.

In metallurgy, graphite is the only practicable material for certain molds and castings. In metal fabricating, it has valuable applications in run-out tables, canisters and brazing fixtures. In refractories, it displays high resistance to thermal shock. New uses for graphite are being found in aircraft, missile and rocket manufacture, and in nuclear power programs.

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Circle 673 on Page 53

were discussed. Production processes for nodular iron, resin-coated sand, and shell molds also were described.

Most of the paper centered on crankshaft production for which advantages were listed from use of nodular iron and shell molding. All machining on nonfunctional surfaces was eliminated. Where machining must be done, chip production was reduced 70 per cent compared with forged shafts. This is attributed to accuracy and uniformity of dimensions on parts cast in the shell molds.

Casting cleaning costs were reduced as were maintenance costs, particularly on patterns. Some of the original patterns installed about ten years ago when the process was put into production still are in use. A prime advantage of the shell molding setup is the production improvement realized from the high degree of automation employed.

Gating and Risering of Ductile Iron, by panel consisting of J. A. Davis, Battelle Memorial Institute, Columbus, Ohio; J. C. McCartney, John Deere Malleable Works, East Moline, Ill.; D. M. Marsh, Cooper-Bessemer Co., Mt. Vernon, Ohio, and H. O. Meriwether, Lynchburg Foundry Co., Lynchburg, Va.

Discussing the effect of metal composition, Mr. Davis pointed out that the carbon equivalent has the major effect on shrinkage of ductile iron. High sulfur content raises the magnesium requirement, but excess magnesium increases shrinkage and dross formation.

Designing of gates and risers for green-sand ductile iron casting is an art rather than a science, according to Mr. McCartney, who gave gating dimensions for various castings. His foundry produces ductile iron castings in weights up to 400 lb.

Most difficulty in gating and risering is encountered with castings having widely divergent section thicknesses, Mr. Marsh stated. Casting in dry-sand molds, Cooper-Bessemer uses no risers on some large castings having uniform sections. Practice is to gate in at several locations to obtain good metal distribution and uniform temperature gradients.

Risers are needed when heavy and light sections join, when joints of heavy sections form a hot spot, and when a thin core is surrounded by a large metal area. On a new job involving small castings it is advisable to start with no risers, section the casting, and then determine where risers or chills should be added.

Mr. Meriwether described how Lynchburg Foundry Co. uses a mathematical method for determining dimensions of gates and risers of shell-molded castings weighing up to 75 lb. By first selecting the pouring time required for the mold, it is possible successively to calculate optimum sizes of sprue height, choke area, ingate areas, runners, and riser.

INDUSTRIAL ENGINEERING

● FOUR papers were presented at the two sessions devoted to the subject of industrial engineering and costs. Topics discussed related to cost control, job evaluation, incentives, and work measurement.

Controlling Costs of Foundry Operations by K. T. Rinderle, Farrell-Cheek Steel Co., Sandusky, Ohio. Aims of the foundry's cost control system should be explained to the foremen in a language they can understand. Only those costs over which a foreman has some control should be regarded as his responsibility. After expenses are collected for a sufficiently long period, a budget allowance can be established. Then a graph showing how actual costs compare with the set goals can be made.

Such charts can be used in various manners, so long as the information they give can be indicative of how the department is progressing in meeting its target. This approach of measuring actual performance against an established goal will encourage people to do other than come on the job just to "make a living."

Job Evaluation—Asset or Liability by A. G. McNichol, Canada Iron Foundries Ltd., Toronto. The Co-operative Wage Study, a job evaluation program developed jointly by management and labor under direction of the National War Labor Board in 1943-45, has become used rather generally in recent years. The plan includes 1) job description, 2) job classification, and 3) job evaluation.

By itself, job evaluation will not produce direct savings similar to wage incentive and methods programs. Its benefits usually are evident in the form of increased morale and harmony in the labor force. In combination with other management techniques, however, job evaluation is an invaluable aid. A necessary followup to job evaluation is work measurement; nevertheless, in one of its major fields, wage incentives, a well designed system can fail unless it is applied to a sound base rate structure developed by job evaluation techniques.

Analysis of the Incentive Questionnaire, by M. T. Sell, Sterling Foundry Co., Wellington, Ohio. Data from questionnaires sent to foundries throughout the world provide an insight into incentive plans used by foundries in the five employment size groupings of 1-50, 51-100, 101-200, 201-300, and 301-over. Large companies are more apt to install their own plans than are small companies.

In determining time allowances for a job, small foundries often depend on estimates. Larger foundries more often use standard data or time studies. Incentive plans usually are started in the molding department, followed in order by coremaking, castings cleaning, core fitting and finishing, pouring, shakeout, melting, and indirect labor.

A large number of incentive, piece work, and profit sharing plans were started in the last five years.

Work Measurement at Pour and Shakeout, by R. S. Casciari, Lebanon Steel Foundry, Lebanon, Pa. Purpose of the study was to provide an engineering approach to the development of incentives for nonrepetitive operations like pouring and shakeout. The goal was to develop a technique for measuring group time and effort so incentives similar to those used for repetitive jobs could be set up. Success in the work was considered an important factor in

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raising morale and productivity of workers performing nonrepetitive jobs.

Result of the work is a plan understood by the workers and fair to all concerned. Based on a study of the operations, standards were set up and are applied daily on a group basis. Worker morale has improved and performance has increased 25-30 per cent on pouring and shakeout operations.

BRASS and BRONZE

● ACTIVITIES of the AFS Brass and Bronze Division consisted of four technical sessions and a roundtable luncheon. One of the sessions was a seminar devoted to the salvage and repair of copper-base alloy castings.

Among subjects discussed at other sessions were gas content, directional solidification, fluidity, shell molded test bars, and a new method of degassing. The economic outlook for brass and bronze castings was the topic at the roundtable luncheon.

Formation of Dispersions in Molten Copper by Mechanical Mixing, by D. N. Williams, assistant division chief, and R. I. Jaffee, division chief, nonferrous metals division, Battelle Memorial Institute, Columbus, Ohio, and J. W. Roberts, research engineer, Westreco Inc. Dispersion hardening is an attractive alloying procedure for copper and copper-base alloys since strengthening can be obtained with relatively small losses in matrix physical properties such as thermal or electrical conductivity. Powder metallurgy studies, in which Al_2O_3 and SiO_2 were selected as the dispersed phase, have demonstrated that a uniform dispersion of fine particles in copper will result in significant improvement in tensile and stress-rupture properties.

Powder metallurgy processing would not be feasible for large scale low-cost production of copper-base alloys.

As a result, methods of preparing dispersion hardened copper by other methods are of interest. Of the several methods which might be envisioned, that of mixing a finely divided solid phase into molten copper just prior to casting appeared to be the most versatile process, since it should be applicable to a number of different dispersion materials and matrix copper alloy compositions.

Theoretical considerations indicate that at least three factors would be important in the application of mechanical mixing of dispersed solid phases in molten copper and copper alloys: 1. The dispersion material must have negligible solubility in copper, both in the solid state and the molten state to at least 212° F above the melting temperature. The material must also have a melting temperature at least 212° F above that of copper. 2. Some meltability of the material by molten copper must be present or must be induced by special pretreatment to permit the dispersion material to enter into the molten copper. 3. The settling or rising rates of the dispersion material in molten copper must be sufficiently low so that the alloy can be cast before separation.

Molybdenum and tungsten carbide were selected as suitable dispersion materials in copper alloys. Molybdenum was successfully dispersed in a copper-aluminum alloy, but tungsten carbide could not be maintained in molten copper, apparently as a result of a strong tendency toward agglomeration.

Fluidity of 85-5-5-5 and Composition M Metal, by R. A. Rosenberg, research metallurgist, H. D. Brody, former research assistant, and F. C. Monkman Jr., director of research, research and development division, Walworth Co., South Braintree, Mass. Foundrymen often experience difficulty in pouring thin-walled or intricately shaped castings. Either the castings do not fill completely or their strength is lowered by cold shuts and uncontrolled shrinkage. In bronze alloys used as valve materials designs previously thought too difficult to produce by foundry techniques may be possible if the fluidity characteristics of the alloys and influence of mold coatings on metal fluidity are understood.

Fluidity, in the foundry sense, is the ability of molten metal to fill a mold. It can be defined as the distance that liquid metal flows in some standard mold cavity. It is a complicated concept, dependent not only on the metal concerned, but also on the mold materials, the mold shape, and the pouring conditions.

Composition M and 85-5-5-5 are common valve materials, but fundamental knowledge of the fluidities of those alloys is limited. Therefore, experimental work was carried out to determine the effect of superheat and pressure head on the fluidities of the two alloys by employing the vacuum fluidity test. Work also was performed to observe the influence of various sand mold coatings on the fluidities of the alloys.

For equal superheat, 85-5-5-5 exhibits less fluidity than Composition M metal. Fluidity of 85-5-5-5 was doubled and Composition M tripled with 400° F superheat. Experiments showed that at 2250° F the fluidity of the former increased about 90 per cent for metal heads between 15.7-32.7 in. of liquid copper.

Brass and Bronze Research Progress Report, sponsored by AFS Training and Research Institute, was presented by R. A. Flinn, professor, chemical and metallurgical engineering department, University of Michigan, Ann Arbor, Mich. From a recently prepared textbook for use at the University of Michigan, the student becomes aware that the physical properties of cast materials are only about half of those of wrought. Engineers today are interested in the as-cast properties, also in soundness of the metal. How do you calculate in advance the soundness of a casting of given design? This became the purpose of the research.

The start was with a 2 x 2 x 12 in. test bar of 85-5-5-5 metal poured at 2025° F in a dry sand mold. The bar was chilled at one end and had the gate and riser at the other end. Other bars were 9, 6, and 3 in. long. All were studied as to tensile strength, density, leak rate, thermal gradient, and solidification. Over the history of the project, different casting shapes were used. It is believed the research will show the distance a chill is effective and a

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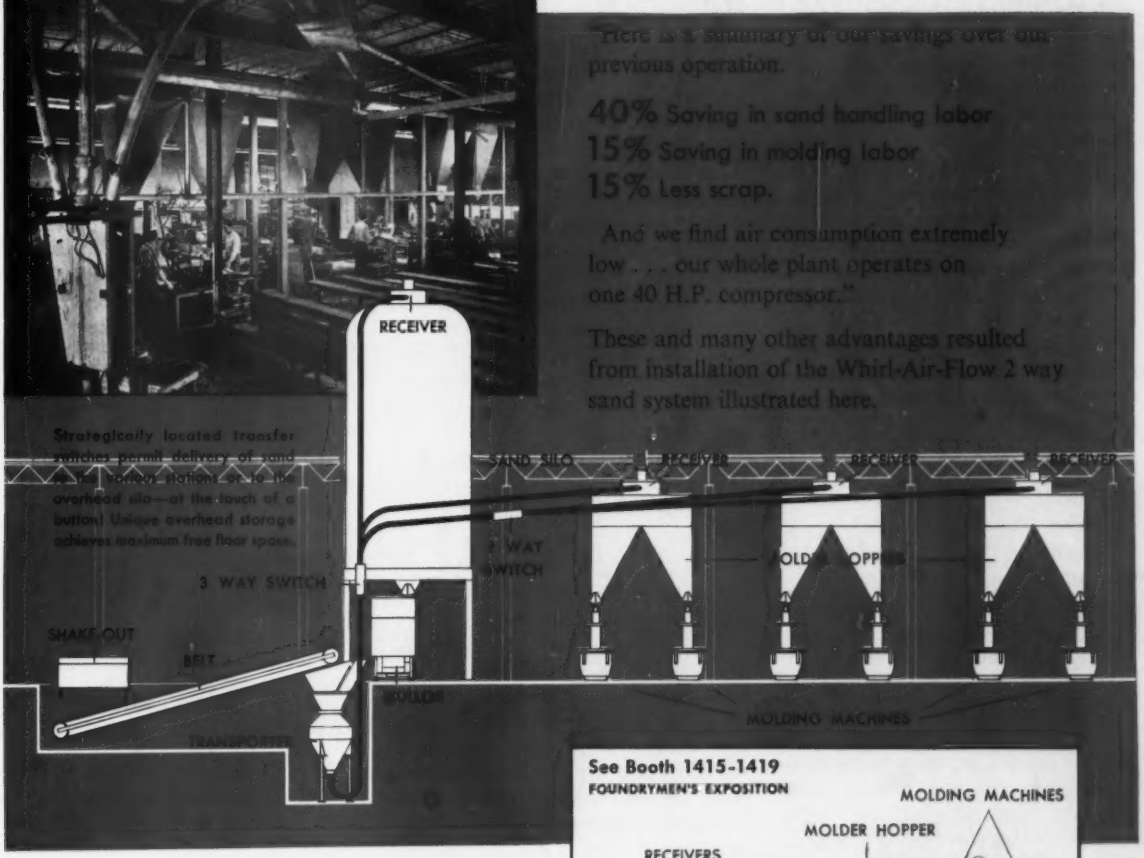

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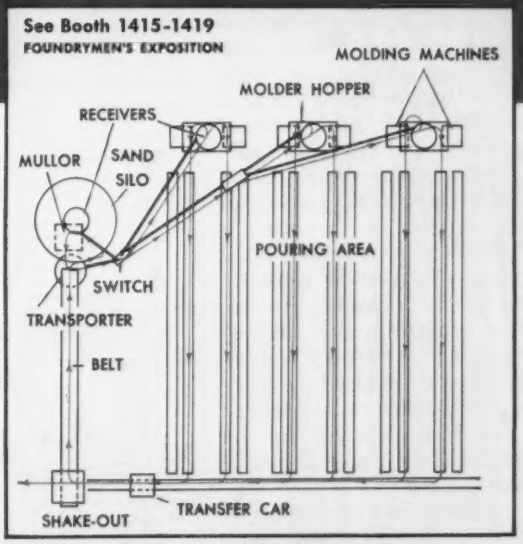

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riser is effective. It may also suggest what is the best type of metal to use.

Effect of Section Thickness, Gas Content, and Directional Solidification on Mechanical Properties of Eight Copper-Base Casting Alloys, by J. O. Edwards, D. A. Whittaker, Department of Mines and Technical Surveys, Ottawa, Ont. This dealt with the difficulty of attaining pressure tightness of large brass castings. Test bars measure only quality of the metal—they do not tell what the properties of the castings will be.

The eight alloys included both low and high shrinkage compositions. Tapered bars were used to relate section thickness and mechanical properties. These bars were gated in two ways to provide for directional and nondirectional solidification. It was found that mechanical properties of most materials drop off with an increase in section thickness.

The Inherent Characteristics of Cast 70-30 Cupro-Nickel, by B. F. Shepherd, chief metallurgist, Ingersoll-Rand Co., Phillipsburg, N. J. Increasing service requirements necessitates higher pump pressures, making it imperative to produce sound castings with integrity. The weight of equipment is important so that thinner pump sections which can be produced by higher strength materials are advantageous to the designer as well as the foundryman. Corrosion resistance to sea and brackish water, compatibility with wrought components, antifouling, and freedom from pitting under varying water velocities have directed the attention of the pump designer to use of 70-30 cupro-nickel castings.

In sections 2 in. and over, properties were found to be markedly affected by silicon content. The silicon level required to meet the tensile properties of MIL-C20159 seriously affected weldability. Satisfactory weldability was obtained with low silicon contents but did not produce the required tensile properties.

Use of columbium in conjunction with silicon created a new weldable alloy with mechanical properties much higher than with silicon alone. The amount of silicon and columbium required depends on the strength-ductility level desired. At 40,000 psi yield strength, silicon and columbium should each approximate 0.45 per cent.

Mechanical properties are markedly affected by cooling rate in the mold. While the 70-30 cast cupro-nickel alloy is not considered heat treatable, it was found that the mechanical properties can be substantially increased by homogenizing heat treatments. The inherent potentiality of any composition is realized by homogenization. This heat treatment can be used to neutralize the difference in cooling rate existing in castings, and to realize the maximum strength potential of any composition.

Production heats have been made in induction and direct arc furnaces. Direct arc heats at 6300 lb have been melted utilizing up to 75 per cent returns. The melting practice and analytical equipment permit close control of the composition, particularly the iron, columbium, and silicon.

Salvage and Repair of Copper-base Alloy Castings, a seminar featuring the following subjects:

Impregnation, by C. Behen, Metallizing Co. of America, Chicago. Impregnation can be used to salvage castings with weeper-leaker type defects but not castings with gross structural defects. Two types of impregnants exist—one consists of a sodium silicate vehicle with powdered copper, iron, and clay; the other is a straight liquid plastic. Both are used in pressure-vacuum equipment designed to force the impregnant into porous casting areas.

The proper time to impregnate is after machining has been done. Impregnated castings are said to be as strong as unimpregnated castings.

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Weld Repair of Aluminum and Manganese Bronzes, by E. Garriott, Ampco Metal Inc., Milwaukee. Aluminum bronze castings are weldable with the metal arc, carbon arc, and inert gas consumable electrode processes. Manganese bronzes are weldable with those processes as well as with the oxyacetylene process.

Welding procedures involve cleaning the area to be welded, avoidance of sharp corners, use of high heat, and preheating the work. The area in which welding is done should be well vented.

Weld Repair of Tin Bronzes, by J. Mikulak, Worthington Corp., Harrison, N. J. Success in welding tin bronzes depends somewhat on quality of the metal in the casting. Good quality metal is required. Also, welding should not be done into a casting skin, nor into impregnated castings.

A weld creates a high stress area, therefore tin bronze castings should be preheated to about 450° F to reduce stress problems. High current densities and a long arc should be employed. Electrodes and gases must be dry, and good general welding procedures should be used.

Shell Molded Test Bars for Tin Bronze Casting Alloys, by S. Goldspiel, E. W. Chrzan, and M. L. Foster, supervisory foundry metallurgists, Material Laboratory, New York Naval Shipyard, Brooklyn, N. Y. Shell molding, which has good potential for production of ready-to-test tensile bars with practically no machining was investigated for G, M, and Z bronze alloy castings as a method to replace current practice of tensile bar production which involves machining, time delays, and expense. For the particular alloy types, the problem was to determine the type of pattern and shell make-up which would produce as-cast bars having properties substantially equivalent or of constant known relation compared with those obtained from conventionally specified bars.

The phases investigated to date include (1) correlation of properties obtained with shell compared with core molded bars, (2) relationship between temperature of pouring and tensile properties for both shell and core molded bars, and (3) determi-

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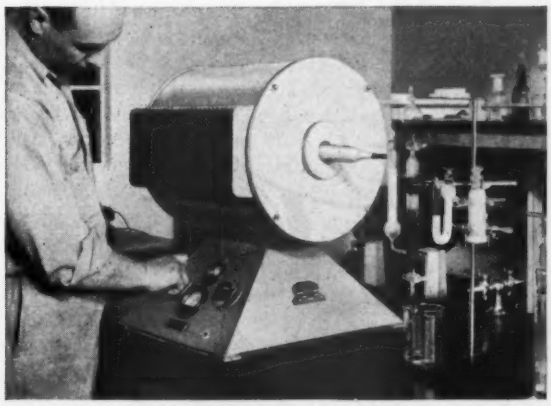
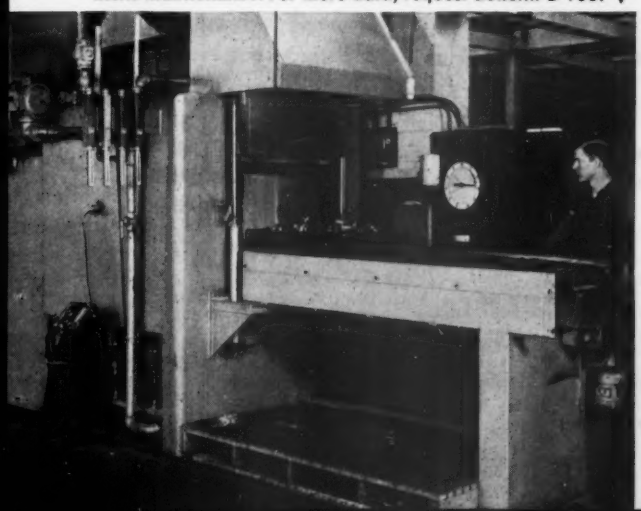
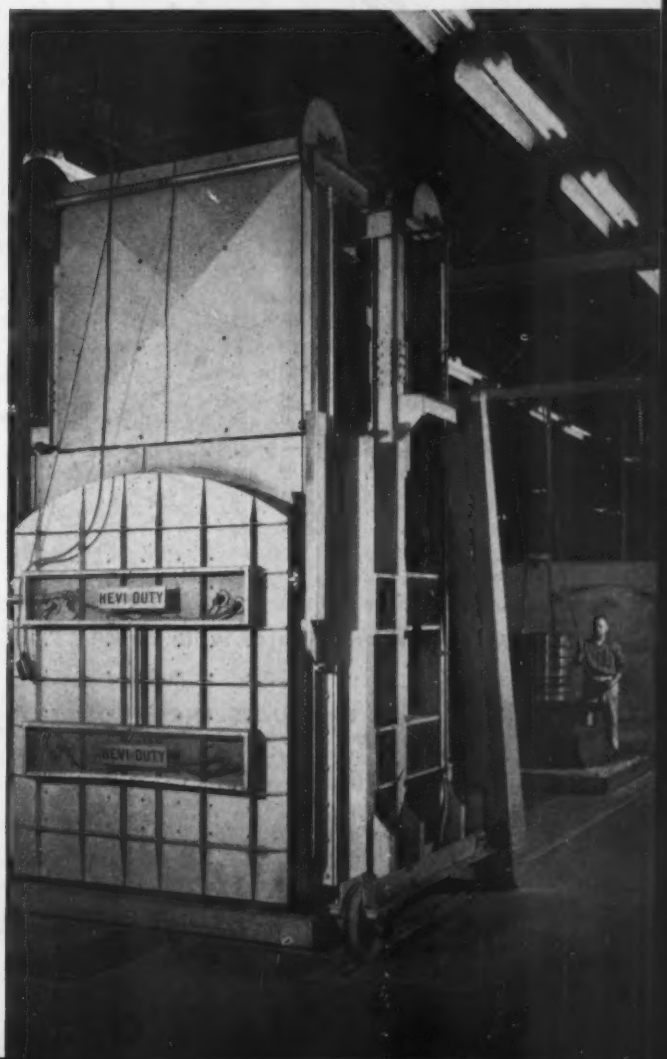


▲ *Merit Corp., Milwaukee, Wis., uses a Hevi-Duty tube furnace to maintain precise temperatures in laboratory quality tests on briquettes used by foundries as an additive to gray iron melts. Two-stage combustion operation on crushed sample burns off free carbon at 1679°F, total carbon at 2471°F.* **For more complete information, please write for Bulletin 254.**

Superior Metal Treating Corp., Muncie, Ind., uses two Hevi-Duty automatic Clean-Line furnaces 24 hours a day, 5 days a week for carburizing, carbonitriding and bright hardening. Temperatures range to 1925°F. The load-transfer mechanism is outside the heating chamber, reducing equipment maintenance. **For more data, request Bulletin D-100.** ▼



This Hevi-Duty traveling, double-end, box furnace provides ±10°F control at temperatures to 1850°F for bright tempering and stress relieving stainless steel jet engine weldments. This furnace is in continuous operation. User reports brightness improves during process. Unit provides bell-furnace mobility despite lack of head room. **Please write for Bulletin 653.** ▼



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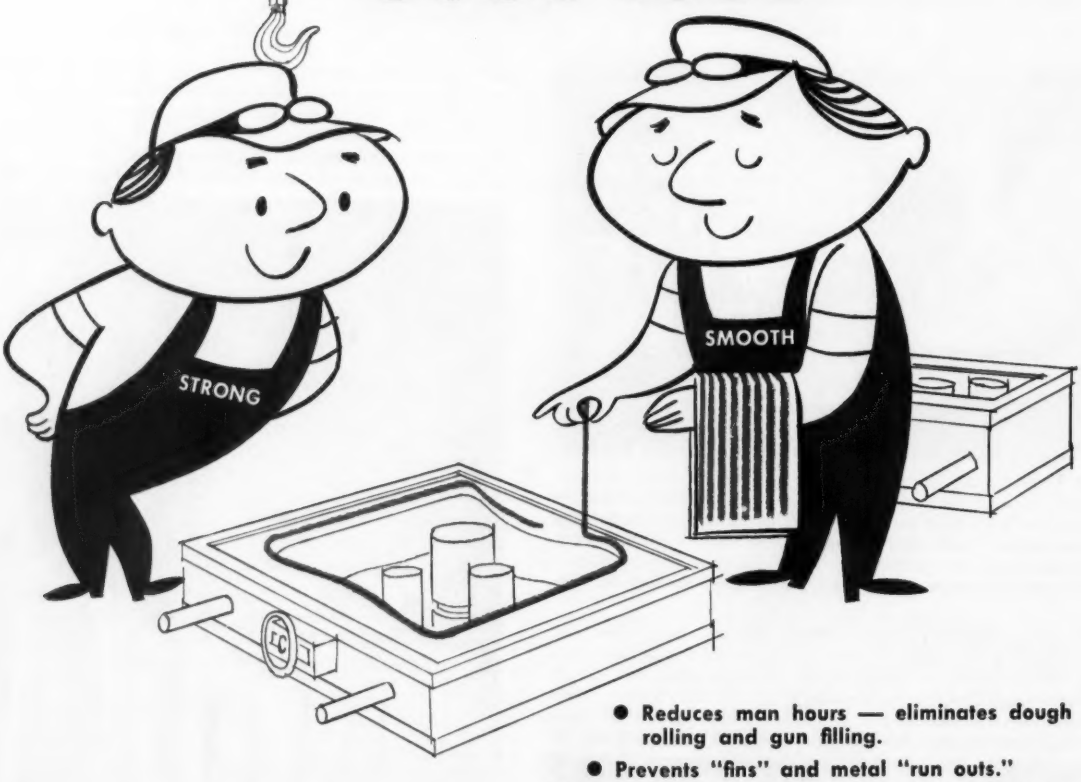

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nation of the effects of such factors as temperature of pour, mold material, alloy and pattern type on the equivalency of results obtained from actual tensile tests.

It was concluded that bars poured by different methods are equivalent when the macro and microstructures and soundness are similar. The importance of the three factors is in the order listed. Indications are that for each alloy type there is a determinable constant relationship between the tensile properties for the two bar types at a pouring temperature of 2000° F and for standardized molding practices. Values obtained from both bar types under routine foundry control conditions compare favorably with those from bars made under experimentally controlled conditions.

Casting Characteristics of a Mn-Ni-Al Bronze for Propellers, by G. H. Bradshaw, M. M. Kennedy, and S. H. Dorn, Philadelphia Naval Shipyard, Philadelphia. This research was conducted to determine in advance the characteristics of a high manganese nickel aluminum bronze and a nickel aluminum bronze. The former proved to be the superior metal. It also had better fluidity.

A New Method for Degassing Copper-Base Foundry Alloys, by R. J. Cooksey and R. W. Ruddle, Foundry Services Inc., Cleveland. Presented by Mr. Ruddle. In addition to presenting a new method for degassing, this paper reviewed degassing practice and suggested a means for assessing the efficiency of various methods of degassing.

Conclusions reached were as follows: 1. The reduced pressure test, popular with light alloy founders, has been adapted to qualitative measurement of the gas content of copper melts. 2. The majority of copper alloys may be cheaply, satisfactorily, and effectively degassed with the new degasser. 3. Application rates vary between about 0.1 per cent of the melt weight for melts of 1000 lbs and upwards, and 0.20-0.25 per cent of the melt weight for smaller melts. 4. Besides removing gas from copper alloys, it appears that the new degasser may also be effective in cleaning the melt. The results of these two effects is often a marked increase in the tensile strength, elongation, and density of these alloys. 5. Use of the new degasser effectively reduces the incidence of surface defects such as blistering and spilling in wrought copper alloys.

Roundtable Luncheon — One of the largest roundtable luncheons in the history of the Brass and Bronze Division, on the second day of the convention, brought to a close the activities of this group. More than 135 attended. R. B. Fischer, metallurgist, Ingersoll-Rand Co., Phillipsburg, N. J., and chairman of the division, presided.

Speaker was N. A. Birch, National Bearing Div., American Brake Shoe Co., St. Louis, and his subject **What's Ahead for the Copper-Base Alloy Foundry Industry.** Because of the decline in use of brass and bronze castings, foundrymen in this field find it difficult to be optimistic. Between 1947 and 1959, tonnage dropped 13 per cent and during the same period the number of foundries declined by 300. The trend in both categories continues down.

Needed to combat the decline, said Mr. Birch, is research and cost stability. Foundrymen must know their costs. There must also be better liaison between casting producers and users. Marketing programs also are a must.

Mr. Birch predicted the price trend will continue to be up. Competition of brass and bronze castings with other metals and plastics will be more severe in the future than in the past. Green sand and its modifications will continue to be the main molding medium. There will be more use of synthetic sand and more automation of foundry processes.

Among plus factors for makers of brass and bronze castings Mr. Birch cited (1) availability of equipment to give greater mechanization, (2) increased technical direction from ingot makers, (3) new strength and growth in technical societies, and (4) a new potential for bold action in students graduating from technical schools.

SAFETY and HYGIENE

● SAFETY, hygiene, and air pollution was discussed at one session in which topics covered included dust collection, safety programs, and eye protection.

In addition to the speakers who dealt with these subjects, the program included two motion pictures: 1. "It's Up to You," a strikingly effective film on eye protection produced by the National Society for the Prevention of Blindness. 2. "Low Volume, High Velocity Exhaust Systems," an English film demonstrating a simple, efficient method of exhausting dust created by foundry cleaning operations.

Dust Collector Review, by D. G. Stephan, U. S. Dept. of Health, Education, and Welfare, Cincinnati. Dust collection laws have been becoming increasingly stringent in the recent past and are certain to become even more so in the future. Dust collection is necessary to fulfill moral and legal obligations as well as to prevent contamination of other products, reduce waste, and recover valuable materials.

Forces which can affect dust particles are gravitational, inertial, filtrational, electrostatic, thermal, sonic, and magnetic in nature, but only the first four have been employed to any considerable extent. Six types of collectors are in common use: Settling chambers, inertial collectors, cyclone collectors, filter bags, electrical precipitators, and scrubbers.

The first step in selection of a collector is to know what is to be collected. Size, shape, and density of particles are important. Other factors to be considered include the physico-chemical properties of the particles—how they will agglomerate, whether they will pick up water, degree of stickiness, flowability, corrosiveness, electrical conductivity, inflammability, and toxicity. It also is necessary to know about the gas stream being collected. This point involves the same factors listed for dust particles and also includes volume and steadiness of flow, plus the distribution of particles in the flow.

Successful dust collection further requires a decision as to what percentage of particles is to be collected, what is the susceptibility of the region to pollution (that is, how heavy other pollution is), and what limitations the law provides.

Finally, the economic factor has to be considered. It includes cost of installing, operating, and maintaining a collection system. In some instances, it may be necessary to use a combination of collectors of various types.

Loss Prevention through Accident Prevention in the Foundry, by G. A. Riley, American Brake Shoe Co., New York. It has been proved conclusively that accidents cost a company money in addition to causing human suffering. Brake Shoe tries to eliminate all accidents, not just lost-time, since an accident in which no one is injured still can cost thousands of dollars.

The company uses a committee technique in which it sets up an over-all safety committee plus others based on departments and shifts. Each foreman is indoctrinated about the importance of safety and is expected to discuss the subject with his crew, individually, on a regular but informal basis.

All employees receive a physical check before they are hired and get periodical checks afterward. Each plant has a nurse on duty, and arrangements for a doctor's services are made when a plant is too small for a full-time physician.

Since good housekeeping is regarded as the basis for an effective safety program, each man is expected to keep his work area clear. This step in itself reduces the likelihood of costly accidents.

Brake Shoe feels that its safety program can and does pay because it has estimated that the cost of accidents includes intangibles which total four times the direct costs.

An Eye for an Eye, by J. E. O'Neil, National Society for the Prevention of Blindness, New York. Industry in general doesn't know or care much about eye protection. Some big companies have good programs, but they are definite exceptions.

Employees should co-operate in an eye protection program for personal reasons, employers for economic reasons. Eye protection can and will pay for itself. The attitude of supervision is of basic importance. Any supervisor who will not co-operate should be dismissed.

To be effective, an eye protection program should cover all employees. Wearing goggles should be a condition of employment, and three infractions of the rule should be cause for discharge.

MALLEABLE IRON

● MALLEABLE FOUNDRYMEN participated in three technical sessions, a roundtable luncheon, and two shop courses. Technical sessions related to growth during malleablizing, hardenability of pearlitic malleable, effect of additions on mottling and annealability, and straightening castings. Shop courses were concerned with design, conversion to malleable castings, stress analysis, melting materials, and procedures.

At the division's roundtable luncheon, Hans Heine, technical director, Malleable Founders' Society, spoke on **Are We Measuring Up?** He pointed out that world leadership now held by the free countries can be maintained only by a continuing and heavy investment in the promotion of educational advancement. Many of the world problems are nontechnological in nature, and the speaker urged that the technical people join with others of good intention to solve them.

In the opening session, **White Iron Growth During Malleablizing** by N. R. Kelley and B. A. Ruediger, General Electric Co., Shelbyville, Ind., was discussed by Mr. Ruediger. In this study 1 x 1 x 2 in. white iron bars and some chain were obtained from five producers and subjected to annealing in controlled and decarburizing furnace atmospheres under laboratory and commercial conditions. Dimensional changes were noted and from the results it was concluded that annealing variables of heating rate, first-stage temperature and holding time, and cooling rate during second-stage graphitization have no effect on growth.

Decarburization during malleablization substantially retards growth of white iron. In absence of decarburization the carbon concentration in white iron determines the growth.

Hardenability of Mn-Mo Alloyed Pearlitic Malleable Iron, a report of the Pearlitic Malleable Committee, was presented by Prof. R. W. Heine, University of Wisconsin, Madison, Wis. In this study, pearlitic malleable irons containing 2.35 to 2.67 per cent C, 1.06 to 1.48 per cent Si, and 0.35 to 0.65 per cent Mn were alloyed with 0.18 to 0.28 per cent Mo, and the Mn content additionally increased to as high as 1.33 per cent. The various irons ranging from those without any alloying to those with Mo addition, and with Mo and high Mn were subjected to hardening operations.

Results showed that alloying provided higher hardenability—plain iron in a 1-in. section had Rockwell C hardness ranging from 33 to 38—while with addition of Mo, the hardness ranged from 34 to 46. When the Mn was increased to 0.65 to 0.90 per cent with Mo addition, the hardness was 46 to 59.

Further increase of Mn to 1.08 to 1.33 per cent gave hardness in the range 50 to 61. Higher hardnesses were produced with water quenching than with oil quenching, but water quenching cannot be used to any great extent because of occurrence of cracking. In response to an inquiry on trouble with subsurface pinholing in the higher manganese content irons, it was indicated that the difficulty could be minimized by addition of boric acid and fuel oil to the sand.

Effect of Additions to Melt on Mottling Tendency in Heavy Sections by C. R. Loper Jr., and Prof. R. W. Heine, University of Wisconsin, Madison, Wis. Presented by Mr. Loper. Additions to melt included bismuth, tellurium, thallium, indium, zinc, lead, tin, selenium, cerium, aluminum, arsenic, antimony, titanium, and water vapor. Tellurium provided the greatest effect against mottling tendency, as

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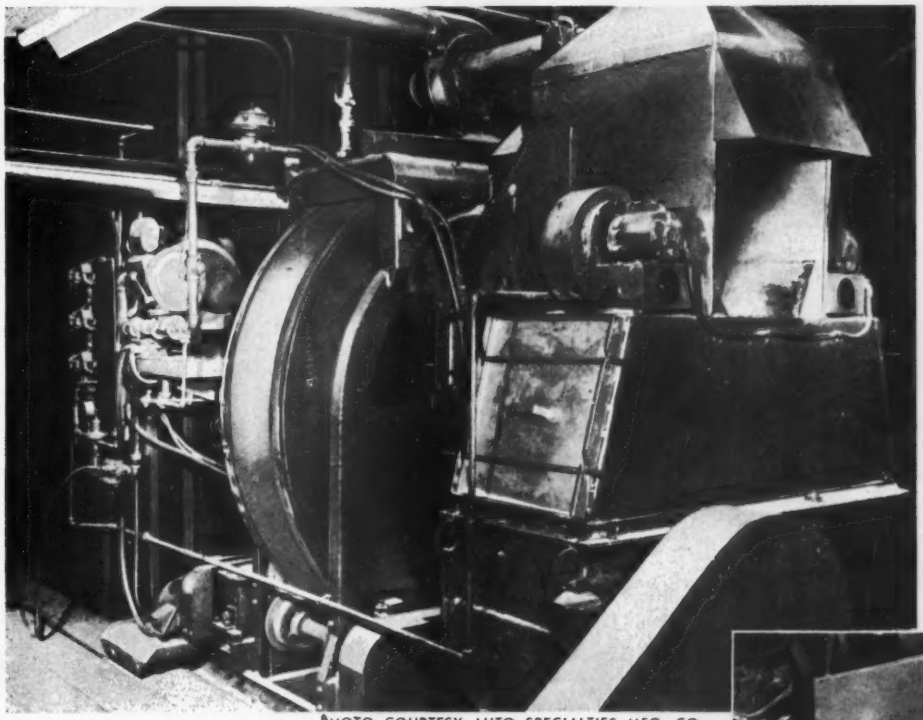
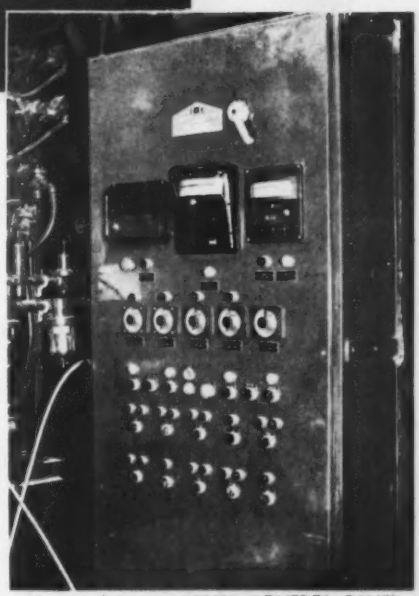


PHOTO COURTESY AUTO SPECIALTIES MFG. CO.

At left, the new Model 890 MIXALL in operation at Auto Specialties Mfg. Co., St. Joseph, Michigan. Other models also available.

The many foundrymen who saw the MIXALL at the recent show in Philadelphia were impressed by its ability to deliver greater batch capacity while keeping production costs down. This is accomplished by a rapid operating cycle: charging, heating, mixing, and discharging are completed in just 5 minutes. Simultaneous heating and mixing are possible because both cycles are independently controlled. To meet today's growing competition, this kind of practical mechanization is often the solution. Perhaps your organization can profit from the many advantages offered by the MIXALL. Our experienced engineers will be happy to discuss your foundry problems and put you on the road to practical mechanization at the lowest cost possible. Write, call or wire.



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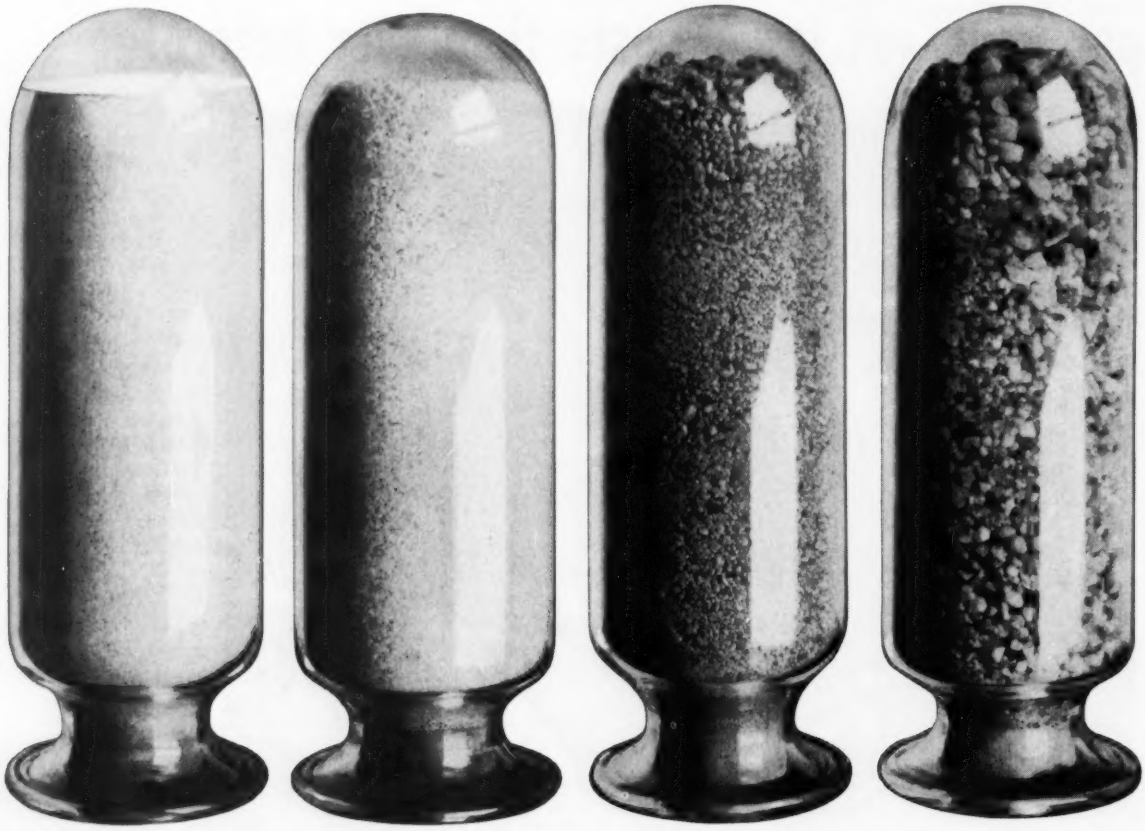

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little as 0.004 per cent being effective with an iron containing 2.10 per cent C and 1.59 per cent Si in a 4 x 4 x 8 in. section.

Bismuth in the amount of 0.01 per cent is effective in preventing mottling, provided the temperature of the iron when the addition is made is above 2642° F, the boiling point of Bi. Preferably the metal temperature should be 2700 to 2750° F, and white fracture is obtained even when the pouring temperature is 2600°. With the addition to metal at the higher temperature, less Bi is required.

Effects of Additions to the Melt on Annealability of White Iron by C. R. Loper Jr., Prof. R. W. Heine, and J. Waring, University of Wisconsin. Presented by Mr. Loper. Conclusions drawn in this study indicate that the effect of melting variables on annealing is much greater than that of additions to the melt; essentially, the higher the nodule count, the better the annealability.

It was found that where low nodule count existed through melting or additions to the melt, good annealability could be secured by a special heat treatment which increased the count. Treatment includes heating to 600° F and holding two hours, increasing the temperature to 1200° and holding two hours, and then raising the temperature to 1700° F.

Malleable Straightening Dies, a panel discussion. Members and their subjects included R. E. Elsea, Central Foundry Div., General Motors Corp., Saginaw, Mich., "Hot Straightening of Transmission Ring, Transmission Part"; L. E. Sutton, John Deere Malleable Iron Works, East Moline, Ill., "Hay Conditioner, Case Die, Twine Needle"; W. L. Olsen Jr., Wagner Castings Co., Decatur, Ill., "Transmission Fork, Bearing Cap, Crankshaft"; N. Zitta, Auto Specialties Mfg. Co., St. Joseph, Mich., "Differential Case Die, Carrier Die, Spring Hanger"; and O. K. Hunsaker, Dayton Malleable Iron Co., Dayton, Ohio, "300-Lb Side Cover, Chrysler Torsion Bar, Torsion Bar."

Panel members showed slides of the castings they had chosen for discussion and followed each with illustrations and descriptions of the dies in which the castings are straightened. Castings covered a variety of sizes and shapes in both standard and pearlitic malleables.

Presses used for straightening included both hydraulic and mechanical types, and various speakers cited the advantages of each kind of press. The presentations also covered types of die steel used and the use of special steels or nitrided steel for coining operations or at wear places on dies. Other points discussed included heat treatment of dies and hot and cold working of castings.

Consensus was that straightening and coining operations are integral steps in the production of malleable iron castings and that relatively few problems are encountered with proper practice.

One malleable shop course included the following panel speakers and their topics: **Demonstration Showing Various Elements Accounting for Casting Failure**—C. R. Baker, Albion Malleable Iron Co., Albion, Mich.; **Demonstration Showing Castings Replacing a Poorly Designed Stamping**—J. L. Flitz, Central Foundry Div., General Motors Corp., Saginaw, Mich.; **Need for Direct Communication Between Foundrymen and Designers**—H. J. Heine, Malleable Founders' Society, Cleveland; **Discussion of Design Engineers' Terms**—J. B. Caine, Cincinnati; **How Lacquer Coatings Are Used for Stress Analysis**—R. A. Johns, Belle City Malleable Iron Co., Racine, Wis., and **Scrap Reduction Through Better Design**—J. W. Beckham, Texas Foundries Inc., Lufkin, Tex. Session also included a motion picture, **The Big Difference.**

Concluding shop course was concerned with melting materials and procedures and was handled by the following panel: **Silvery Pig Iron vs. Ferrosilicon, and Ferromanganese vs. Spiegel**—H. T. Sheppard, Belle City Malleable Iron Co., Racine, Wis.; **Typical Cold Charge and Charge Cost**—J. W. Clarke, General Electric Co., Erie, Pa.; **Malleable Pig vs. Steel Scrap**—C. M. Eberhardt, Central Foundry Div., General Motors Corp.; **Hot Blast vs. Cold Blast**—Norman Lillybeck, Modern Equipment Co., Port Washington, Wis., and **Northern vs. Southern Coke**—W. E. Jaeschke, Whiting Corp., Harvey, Ill.

LIGHT METALS

● NINE TECHNICAL papers and a luncheon meeting with the Die Casting Division were presented by the Light Metals Division. Subjects included elevated temperature properties, production techniques, and inclusion identification in magnesium alloy castings; production of titanium castings, and effect of temperature on aluminum alloy test bars.

Inclusion Identification in Magnesium Alloy Castings, by B. Lagowski and W. A. Pollard, Department of Mines and Technical Surveys, Ottawa, Ont., Canada. Presented by Mr. Pollard. Inclusions occurring in castings of EZ33A and ZH62A castings were classified into three types. The first two types are caused by entrained sand grains. Type 1 inclusions are visible to the naked eye; Type 2 inclusions are not. Type 3 inclusions are believed to be caused by aluminum which originates with the exothermic materials used in pouring sleeves.

During discussion it was pointed out that Type 1 inclusions have an adverse effect on mechanical properties of castings. Types 2 and 3 are tolerable and have little effect on properties.

Casting of Ordnance Type Titanium Parts, by H. McCurdy, Battelle Memorial Institute, Columbus, Ohio, and H. W. Antes and R. E. Edelman, Frankford Arsenal, Philadelphia. Presented by Mr. Edelman. Tank components weighing up to 100 lb were cast of titanium alloy containing 6 per cent aluminum and 4 per cent vanadium. Machined graphite and graphitic composition molds were used. The latter produced castings with slightly higher surface contamination attributable to an 8 per cent starch content in the expendable mold mix.

Metal was melted in a consumable electrode skull furnace having a water-cooled copper crucible.

Melting and pouring was done in a chamber. Tensile strengths of vacuum melted and argon-helium melted metal are about the same. Elongation, however, for the vacuum melted alloy was 10.6 to 12 per cent compared with 6.4 per cent for the argon-helium melted alloy. Tensile properties of the vacuum cast alloy closely approach specified properties of the equivalent annealed wrought alloy (135,000 psi ult str, 120,000 psi yld str, and 11 per cent elong).

Normal gating systems that minimize turbulence are applicable to casting titanium. Yield on the castings produced for this study was 30 to 50 per cent.

Factors Contributing to the Soundness of Titanium Castings, by J. W. Smith and T. A. Hamm, Oregon Metallurgical Corp., Albany, Oreg. Presented by Mr. Smith. Expendable graphite molds have facilitated development and use of titanium castings.

Mold material consists of 70 per cent BB5 grade graphite powder, 10 per cent black foundry pitch, 8 per cent carbonaceous cement, 7 per cent water, and 5 per cent laundry starch. It produces castings with a surface finish of about 200 microinches rms. Shell cores also are used. They are made of 72-80 per cent graphite powder, 12-20 per cent phenol formaldehyde resin, and 8 per cent pitch.

Experienced gained in making titanium castings for Boeing Airplane Co. indicate that an expendable mold material and shell graphite cores are successful, feeding distance in static casting is limited in cold molds, bottom gating is essential in either static pouring or centrifuging, sounder castings and better yield are obtained by centrifuging, and shrinkage problems in castings are and can be overcome.

Short-Time Elevated Temperature Properties of Premium Quality Magnesium Castings, by Walter Gronvold, Boeing Airplane Co., Seattle. Premium quality is required to make castings competitive with other methods of fabricating missile parts. Since standard commercial casting practices will not produce premium quality, all foundry personnel must have the desire to produce the premium grade. Good foundry technique and close control over all foundry variables are musts. Foundrymen should participate in designing parts to realize the full advantage of the casting process.

The new alloy QE22A-T6 was said to have good room temperature and short-time elevated temperature strength to meet requirements of missile parts. It has better high temperature yield and ultimate strength than 2014-T6 forging alloy.

Thermal Requirements for Porosity-Free Magnesium Alloy Castings, by R. D. Green, Dow Chemical Co., Midland, Mich. Studies were conducted on AZ63A alloy poured in green sand molds containing chills to promote proper thermal gradients for directional solidification. This method of reducing shrinkage porosity in castings was decided upon because mold wall thermal properties are the only ones that can be controlled. Other thermal factors are characteristic of a given alloy.

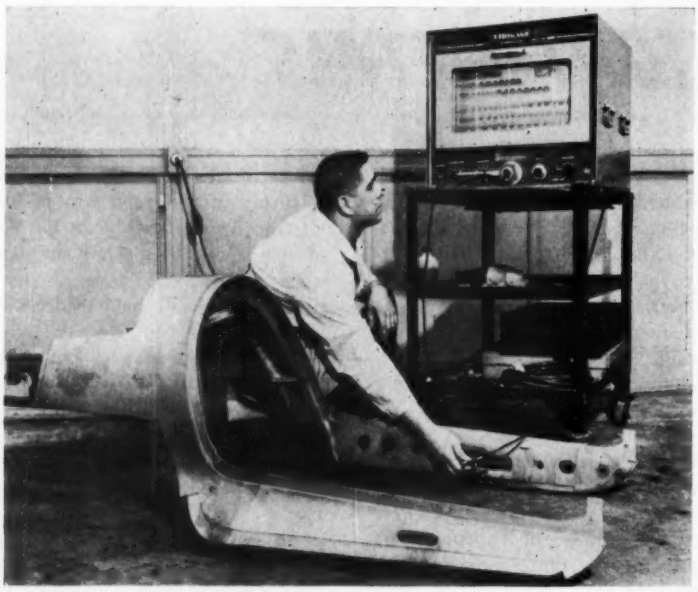
Results indicate that a chill rate of 5° F per inch is desirable for reducing shrinkage porosity. It is believed that this rate also would be desirable for other magnesium alloys.

Techniques for Producing Premium Quality Magnesium Castings for Missile Applications, by M. C. Flemings, E. J. Poirier, and H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass. Techniques employed for producing AZ91C alloy castings for missile applications are summarized. Careful foundry practice is shown to result in sound castings with strengths and ductilities higher than those obtained by usual foundry procedures.

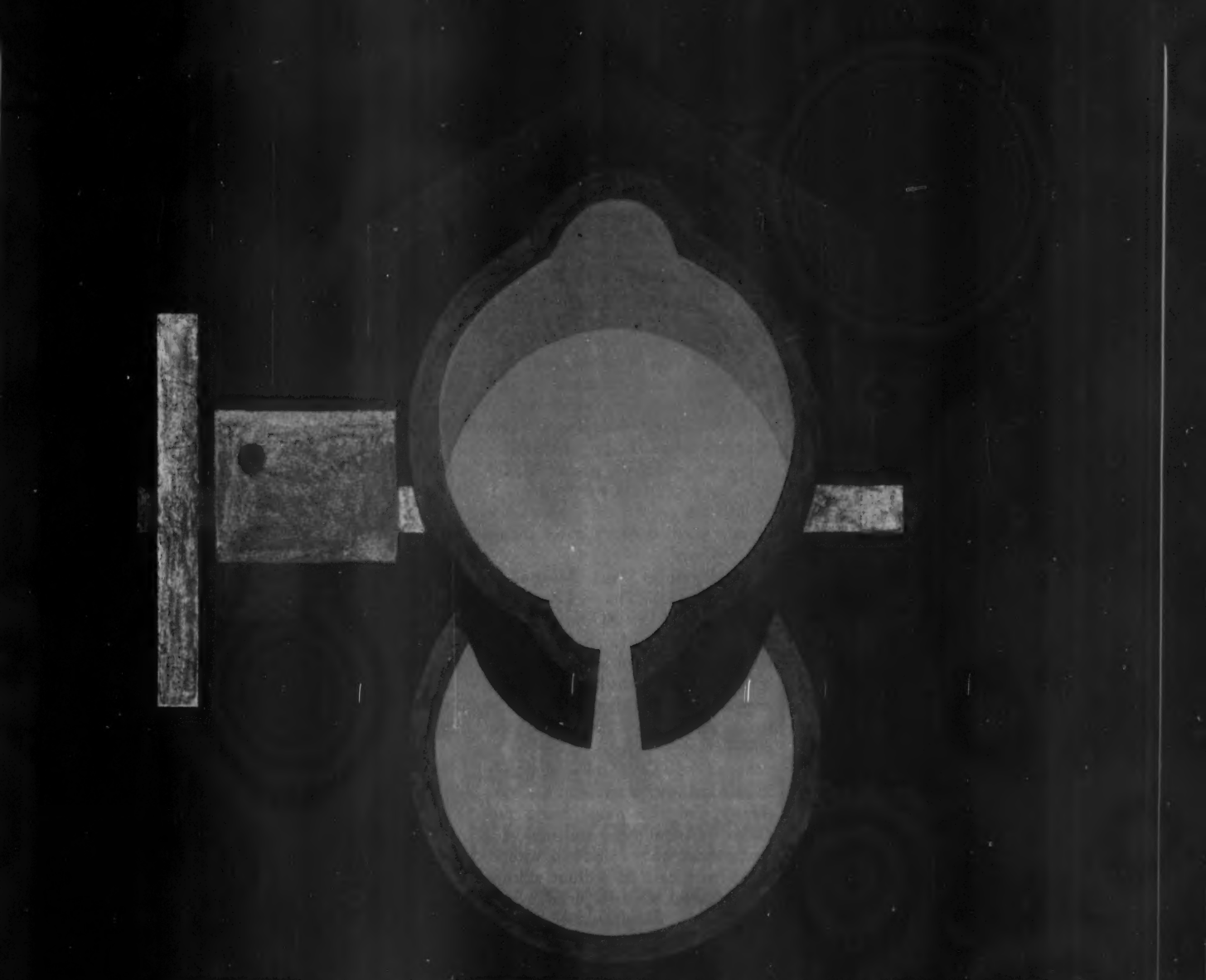
Properties obtained on intricate castings were 37,000 psi ten str, 18,000 psi yld str, and 2 per cent elongation as compared with an average 25,500 ten str, 14,500 yld str, and ¾ per cent elongation expected with commercial practice.

Mold coatings of either amorphous carbon or hexachloroethane improve fluidity of magnesium alloys by as much as 100 per cent and permit production of thinner, more intricate castings than otherwise is feasible.

Effect of Casting Temperature on



CHECKS CORE SHIFT: Ultrasonic resonance gage checks core shift in this magnesium canopy casting at Republic Aviation Corp., Farmingdale, L. I. The gage, made by Branson Instruments Inc., Stamford, Conn., requires access to only one surface. The unit is operated merely by sliding a probe across the outer surface of the canopy and reading the varying wall thickness from a direct reading scale. Readings are instantaneous and accurate to within 0.1 to 1 per cent. Ultrasonic resonance gaging is based on the fact that the natural frequency of a metal or plastic varies inversely with its thickness



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The unusual combination of silky-smooth graphite and super-duty refractory ingredients results in Kaiser Helspot, one of today's finest ladle lining materials.

Kaiser Helspot Plastic makes metal-melting and pouring operations run more smoothly six different ways:

1 ABSENCE OF INCLUSIONS. Helspot minimizes metal contamination, insures cleaner metal . . . provides a way to avoid bits of inclusion material that affect casting quality and cause rejections.

2 LUBRICATED SURFACE. Helspot is non-wetting. Molten metal flows as freely over the Helspot surface as water flows off a duck's back, without penetrating or sticking.

3 EASY SLAG REMOVAL. Clean metal can only be poured from a clean ladle. Helspot successfully resists attack of molten slag and reduces skull adhesion.

4 RESISTS THERMAL SHOCK. The Missouri Super-Duty Fire Clay base—plus blended graphite—produces in Helspot an unusually high resistance to spalling.

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Ask your Kaiser Refractories Sales Engineer about the other advantages of using Helspot Plastic or Helspot Brick for wells, spouts, runners—wherever you want smoother flow of molten metal and minimum slag buildup.

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KAISER REFRACTORIES

Circle 680 on Page 53

Aluminum Alloy Test Bar Properties, by J. W. Meier and A. Couture, Department of Mines and Technical Surveys, Ottawa, Ont., Canada. Separately cast test bars can be used successfully for evaluating melt quality only if they are cast under controlled standardized conditions. This study evaluated the effects of pouring temperature, maximum melt temperature, and prolonged holding time on the properties of test bars separately cast of six commercial aluminum alloys.

Results showed that overheating or prolonged holding times have no lasting effect on properties of alloys S5, SC51, SG70, and ZG61, provided they are poured at the proper temperature. Cooling the overheated melts and pouring at a low temperature did not completely restore the properties of alloy C4, and no recovery of properties was obtained for alloy G10.

Maximum melt and pouring temperatures for alloy C4 and G10 test bars should not exceed 1330° F if consistent and comparable results are to be obtained. A standardized pouring temperature range is necessary to ensure effective melt quality control for the other alloys.

A general correlation of mechanical properties with grain size and density was shown for alloys C4 and G10, although in some cases improvement in grain size or density is not necessarily accompanied by an increase in mechanical properties of the casting. No correlation of mechanical properties with grain size or density could be established for alloys S5, SC51, SG70, or ZG61 which are insensitive to the effects of melt overheating.

Approach to Rigging Aluminum-7 Per Cent Magnesium Castings, by J. G. Kura and W. H. Johnson, Battelle Memorial Institute, Columbus, Ohio. Presented by Mr. Johnson. This paper presented additional data on continuing work first reported at last year's AFS Congress. It was pointed out that thermal gradients in excess of 5° F per inch must be established to achieve casting soundness. This can be done by the use of chills.

Risers should be placed at the side and gated into the casting. If casting design requires that a top riser be used, multiple gates should be employed.

Developments in Magnesium Practice, by J. G. House, Dow Metal Products Co. Div., Dow Chemical Co., Bay City, Mich. Reference was made to the use of sodium silicate-bonded sand, resin-bounded sand, and waterless, oil-bonded sand for molds and cores. Advantages and disadvantages were cited.

Slides were shown of several castings to indicate progress in the complexity and size range being produced. Investment castings of a few ounces and a 1450-lb complicated part cast in sodium silicate-bonded sand were included. Some had cast-in stainless steel tubing, others had very thin wall sections. The newer zirconium and thorium alloys and developments in quality control procedures for foundry processes were discussed.

PLANT EQUIPMENT

● THE ONE SESSION conducted by the Plant and Plant Equipment Committee was concerned with the subject of **Shell Mixing Processes and Equipment for Quality Control of Resin-Coated Sand.** It was discussed by John Albanese, Acme Resin Co., Forest Park, Ill.

Blowing of shell cores, difficult with a mixture of sand and powdered resin, was stimulated by the development of resin-coated sand. Factors necessary for proper coating of the sand grains include: 1. Availability of a liquefied resin. 2. Addition of hexa to create a thermosetting resin. 3. Intensive mixing of the hexa and resin. 4. Mulling so as to coat the sand particles adequately. 5. Breaking up of the lumps formed. 6. Cooling of the sand prior to use.

The simplest and cheapest method of resin application is cold coating but it does not provide the uniformity of hot processes. The former is most suitable for solid core work where no drain-out characteristics are required, or where cores may be blown over a mandrel.

Warm Coating — Processing of sand by the warm coating procedure essentially is the same as cold mixing except that by blowing hot air through or at the sand, the cycle can be reduced. A variation of the warm process is use of hot sand plus lump novolak resins. This process involves heating the sand to about 325° F and adding the lump resin, which melts and coats in contact with the heated sand. The sand then is quenched with a water solution of hexa. Although quality of coated sand produced from lumps is good, the process lacks flexibility in melt point control.

A second type of hot coating process involves use of a liquid novolak material and hexa. It produces a sand of any melt point from the same base resin. In all other processes the melt point of the sand produced is dependent on the type of resin introduced in the muller, and the foundryman's only function is to coat the sand.

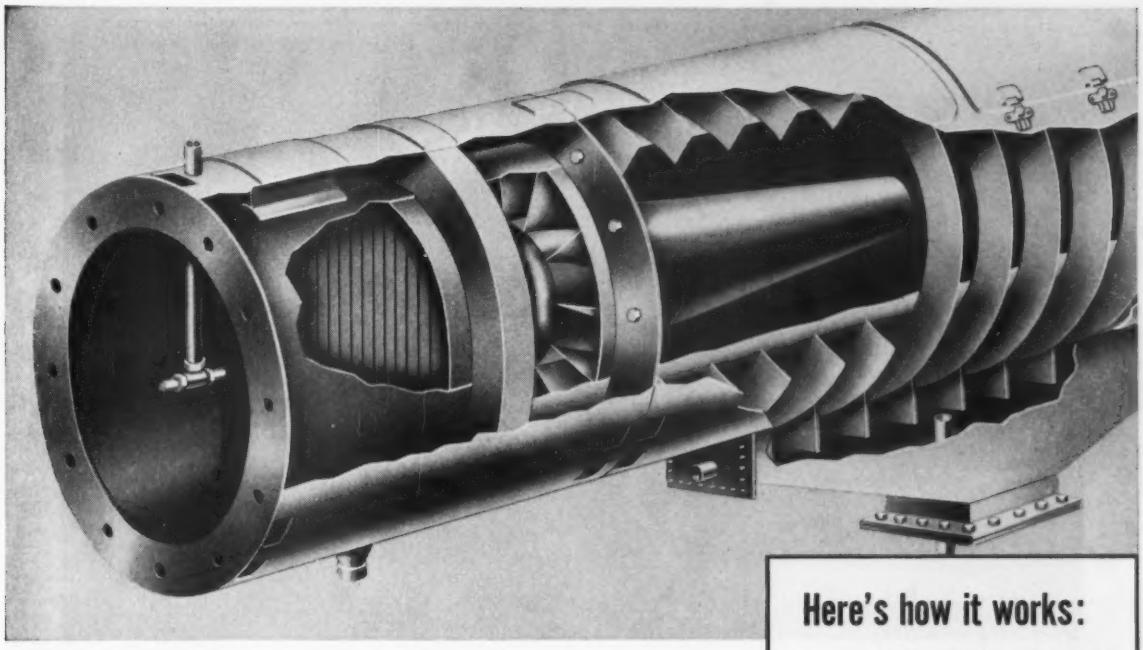
Waxy additives, such as calcium stearate, improve sand flowability, reduce power consumption, and tend to increase tensile strength. They may be added at either the start or end of the coating process or at both times.

When coated sand is discharged, it may have a considerable number of lumps. Equipment should be provided to break down the lumps and cool the sand to a point where lumps will not reform as the sand stands.

Which Equipment?—In selecting sand coating equipment, the foundryman should be guided by several factors. If the sand is to be used to blow solid cores, make strainer cores, or produce slab type molds, the cold coating process will suffice. To produce sand for large cores which need draining for most shell molding operations, hot coating should be considered because of its increased reliability.

Amount of sand needed also is a consideration in equipment selection because muller capacity for coating sand usually is less than for preparing oil-sand mixes. It is preferable to actually coat a sand on the prospective muller and determine accurately both mulling cycles and capacity.

(To be Concluded Next Month)



Here's how it works:

a spray of liquid enters the collector along with the dust. An impingement screen helps to encase each particle with liquid. Then fixed vanes impart a whirling motion to the wet, dust laden air. Moisture and dust particles are thrown to the sides by centrifugal force and drain into a sump.

The liquid used may be water, oil or solvents, depending on the material being collected.

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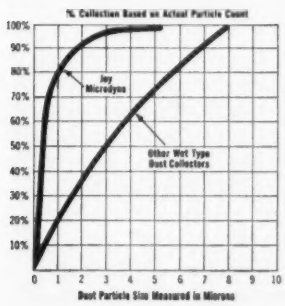

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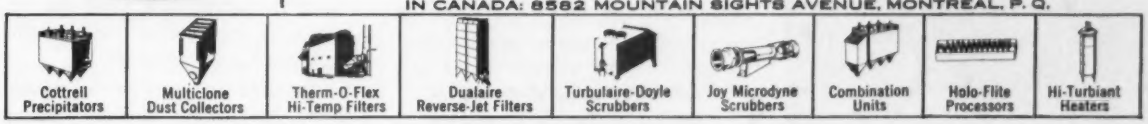


Students in the foundry laboratory of Western Michigan University

Industry and University Develop

FOUNDRY TRAINING PROGRAM

By DR. JOSEPH W. GIACHINO
Head, Dept. of Industrial Technology
Western Michigan University
Kalamazoo, Mich.

● THE FOUNDRY INDUSTRY is a vital backbone of our industrial structure. But like many other phases of industry, a backbone can be replaced if, because of complacency, indifference, and negligence in keeping with important developments and industrial needs it ceases to serve its intended function.

A foundry co-op student is receiving on-the-job experience

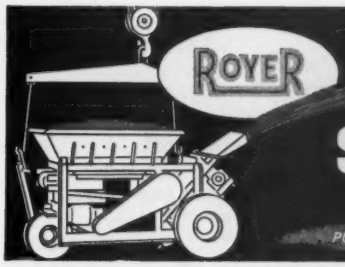
American foundries, to achieve and maintain progress, must recognize (1) that old rule-of-thumb foundry methods no longer can be tolerated and (2) that more skillfully trained personnel must be brought into the industry.

Job Opportunities—According to all available data, foundries will provide thousands of job opportunities for new workers in 1960 and the years ahead. This development, however, is contingent on foundries' ability to meet the challenges of new industrial demands. It is significant, too, that if foundries can meet these challenges, the number of laborers and other unskilled workers will decline and the technician will make up an increasingly larger percentage of foundry employment.

Categorically, this prediction is justifiable because, to meet the new demands of industry, foundries must have personnel who can apply work simplification methods, exercise greater quality controls over products, and initiate and implement more extensive research activities.

The Engineering Technician—Based on reports of the American Society for Engineering Education, Technical Institute Div., the engineering technician can be defined in general as a person whose chief interests and activities lie in the direction of the testing and development, the application, and the operation of engineering and scientific equipment and processes.

Classified on the basis of educational certification, the engineering



SAND CONDITIONING TOPICS

PUBLISHED BY **ROYER**, MANUFACTURERS OF THE FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER OFFERS A PRACTICAL SOLUTION TO HOT SAND PROBLEMS

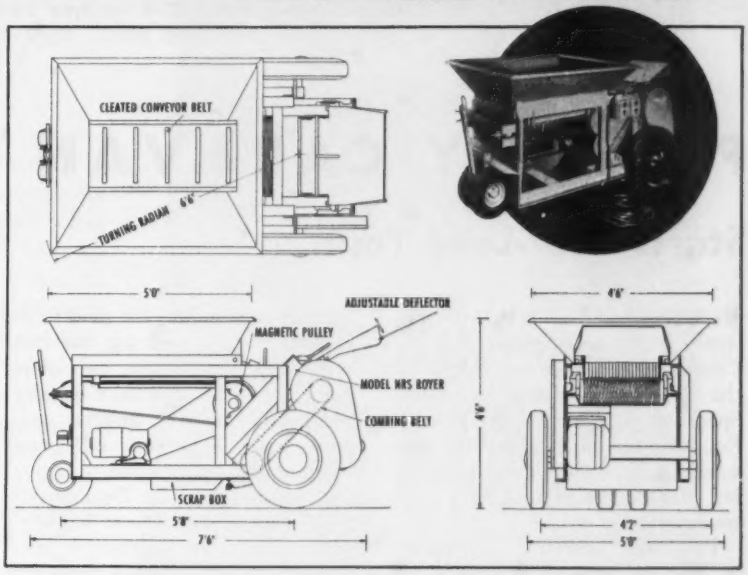
In today's foundry operation, time is probably the most costly element the superintendent must deal with. Sand used for today's casting must be conditioned and ready for use tomorrow. This frequently means sand conditioning at temperatures ranging up to 300° to 400°F.

These destructive high temperature operating conditions seem to plague every foundryman. Foundry equipment suppliers have offered many possible solutions—cooling towers, shake-out belt cooling, water cooling, rotary cooling, bin cooling, etc. But probably no manufacturer has offered more thorough cooling per dollar of invested capital than that obtained with Royer equipment.

All Royer Foundry Units employ the famous Royer Belt Combing Principle. In operation, a combing and mixing action takes place in the feed hopper. This breakdown of the hot sand mass releases the hot gases as the first step

in Royer Cooling. Further cooling of the individual sand particles takes place as the conditioned sand is discharged in an open stream. And finally, the sand heap, now open, light and fluffy, continues cooling at a very rapid rate.

There is a Royer Foundry Unit to solve every sand conditioning problem. Your inquiry is invited. We promise prompt reply—without obligation.



Sand Conditioning costs can be reasonable

When any industry suffers a business recession, however slight, the attention of its leaders automatically shifts to cost cutting and the elimination of waste. Many foundrymen peer wistfully at the large, highly mechanized foundry and imagine semi-automation is the answer.

Looking at the foundry industry realistically, this form of advanced mechanization is not the answer. Seventy-two per cent of the nation's foundries employ less than 50 men—for most of these, advanced mechanization is both a physical and an economic impossibility.

For these foundries, units like the highly efficient Royer MAGNA-SAN are the practical solution to most sand conditioning cost problems. Here is a unit that is foundry-engineered to magnetically clean, mix, blend and aerate shake-out sand right on the molding floor—and at a lower initial cost and with less maintenance than any other mechanical method.

The Royer MAGNA-SAN is ideally designed for use in the small and medium sized foundry—this 73 per cent who most need the advantages of mechanization but cannot pick up the bill. Compare this compact unit, in the drawing above, with your available working space. Notice how the compact design permits easy maneuvering about crowded casting floors.

Capacity-wise, the Royer MAGNA-SAN conditions 45 tons of sand per hour—a full 8 per cent more than its closest competitor. And remember, it is a fact that economy of operation is determined by performance, which is measured by comparative expense per ton of sand conditioned.

We invite you to see for yourself how reasonable sand conditioning costs can be. Send the coupon and we'll rush your copy of the MAGNA-SAN Bulletin RM57 to you by return mail.

ROYER FOUNDRY & MACHINE CO.

ROYER

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KINGSTON, PENNA.

I want to know more about reasonable sand conditioning costs. Rush me your MAGNA-SAN Bulletin.

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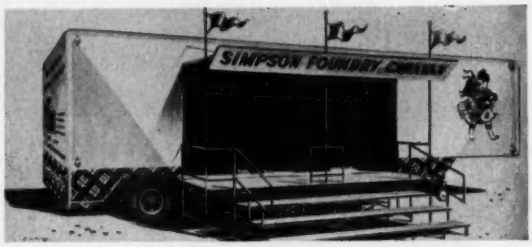
Circle 682 on Page 53



Left—Over-all view of the 37-ft van-type trailer which contains a sand conditioning, handling, and reclaiming plant. *Right*—View of the trailer with stage ready

FOUNDRY CARAVAN

Starts Year-Long Tour

● A YEAR-LONG TOUR of principal foundry cities in the USA and Canada was started last month by the Simpson Foundry Caravan. Sponsored by National Engineering Co., Chicago, it is a mobile sand conditioning, handling, and reclaiming plant, self-contained in a 37-ft trailer.

Full-scale operating equipment is included for continuous sand preparation for green sand or shell molding and for cooling and elevating, pneumatic conveying (batch or continuous), and pneumatic sand reclamation. Each item of equipment is designed to be operated either separately or as a unit of the over-all system.

Purpose of the mobile plant is to extend the company's present Performance Laboratory facilities by bringing the equipment to the foundry rather than the sand to the equipment. By so doing, the company hopes to achieve two objectives: 1. Familiarize more foundrymen with the sand quality, economy, and operational efficiencies possible with mechanized conditioning equipment. 2. Demonstrate, with sand from the host foundry's system, how the company's latest equipment can promote these efficiencies.

The program will include a 15-minute orientation talk which will precede demonstration of the equipment and sand tests. Regional sales engineers and technical personnel from the company's Performance Laboratory will staff the caravan unit.

Equipment on the caravan will include the following: A continuous mixer arranged either to handle system sand or to be integrated with shell molding sand mulling equipment, with which the caravan is equipped; a cooling-elevating-aerating unit which charges pneumatic handling systems (a batch-type system and a continuous system will be shown); a pneumatically operated sand reclamation system; and a wet-type scrubber which will provide dust and fume collection requirements for the system.

The caravan is housed in a 37-ft, van-type trailer. In operation, 16-ft doors will open to reveal interior equipment, and a fold-down stage area will facilitate viewing and demonstration of the equipment. The caravan will be powered by a tractor equipped with a sleeper cab.

The tour began with the close of the 1960 AFS Castings Congress and Exposition in Philadelphia last month. Details regarding routing and arrangements for plant visitation by the caravan can be obtained by writing to the National Engineering Co., 549 W. Washington Blvd., Chicago 6, Ill.

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technician would be a graduate of a technical-institute type of curriculum as accredited by Engineers' Council for Professional Development or recognized equivalent. In industry, he performs semiprofessional functions of an engineering or scientific nature, largely upon his own initiative and under only general supervision of a professional engineer or scientist; he assists, and supplements the work of, the engineer or scientist.

Two years ago a group of foundry leaders in southwestern Michigan, recognizing the need for more qualified personnel, approached Western Michigan University, Kalamazoo, Mich., for assistance. As a result of the combined efforts of the two groups, a special two-year technical foundry and metallurgy program was established. The program is now available to high school graduates and can be pursued either on a regular full-time two-year basis or on a co-operative plan.

The majority of the students currently enrolled are following the co-operative option. In the co-operative plan, industries select students in pairs; one person is brought into the plant and his counterpart is sent to the university. At the end of the semester the two students exchange places. This procedure continues until the students complete the program, which on the co-operative plan is three years. While the students are on the job a university co-ordinator works closely with the employing industry to insure that the students are securing the right kind of experience.

The foundry and metallurgy curriculum at the university requires concentration in the following areas: Communication, mathematics, sci-

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Thor No. 5 series heavy duty air grinders. Safest grinders ever built. 100% increase in power at no increase in weight. Remove far more metal in far less time. Positive safety control, in addition to standard governor, absolutely prevents "run-away" tools. If governor fails, air supply is cut off. Weight 10 lbs. Grip, lever or butterfly throttle. 4,500 and 6,000 r.p.m. grinding speeds.

Thor has a complete range of air grinder sizes and models. There's a Thor grinder to fit any metal removing or finishing problem. Your Thor factory representative or distributor will demonstrate. Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

Thor POWER TOOLS

Circle 683 on Page 53

ence, drafting, industrial processes, molding and coremaking, foundry production techniques, foundry control procedures, metallurgy, metallography, industrial relations, and quality control.

A permanent Foundry Industry Advisory Committee consisting of foundry and university personnel meets regularly to discuss problems associated with the program. From all indications the program is proving to be effective and the participating industries are convinced that it will provide the kind of people foundries need. Members of the committee, of which Thomas T. Lloyd, vice president, Albion Malleable Iron Co., Albion, Mich., is chairman, include the following:

Earl Beyerlein, Fuller Mfg. Co., Kalamazoo; Fitzmaurice Coghlin Jr., Dock Foundry Co., Three Rivers; Robert Cope, Rapidcast Corp., Grand Rapids; Horace Deane, Campbell, Wyant & Cannon Foundry Co., Muskegon; George Garvey, Garvey Pattern Co., South Bend; William Hambley, foundry consultant, Birmingham; Alvin Jacobson Jr., Grand Haven Brass Foundry, Grand Haven; Walter Laetz, Auto Specialties Mfg. Co., St. Joseph; Albert Rhoads, Engineering Castings Inc., Marshall; Jack Secor, Hill & Griffith Co., Niles; Jess Toth, Harry W. Dietert Co., Detroit.

The author and Elmer J. Brune, Dept. of Industrial Technology, Western Michigan University, are ex-officio members of the committee.

PROVIDES LONGER LIFE–NO HOT SPOTS

Acme melting pots and ingot molds assure even heat distribution without hot spots . . . they improve non-ferrous casting quality and put a damper on rejects. Cast of a specially developed iron alloy, Acme pots and molds provide great strength and unusual resistance to high temperatures, too. As a result they consistently reduce down time and substantially cut replacement costs.

Stocked in forty sizes and a complete range of styles, you can standardize on Acme melting pots and molds and be confident of immediate shipment at all times! Take advantage of all these benefits . . . proven over a period of more than 30 years.

★ **FORTY SIZES IN STOCK**

Quick delivery anywhere in the United States eliminates your "stand-by" non-ferrous pot and mold inventory. Write for bulletin listing all sizes and styles.

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Steel Founders' Society Will Revise Handbook This Year

The 1960 edition of the Steel Castings Handbook, to be published late this year by the Steel Founders' Society of America, will be a complete revision. Chapters on purchasing and machining steel castings and a list of definitions of related terms are being added.

New illustrations and technical information on uses of steel castings in fields such as nuclear energy, missile manufacturing, and explosive forming also will be included in the text.

Ten representatives of SFSA member companies are handling the revision. W. W. Heimberger, works manager, Buckeye Steel Castings Co., Columbus, Ohio, is head of the committee, and Charles W. Briggs, technical and research director of the society, is editor of the handbook.

"I've been having trouble plugging the notch lately"

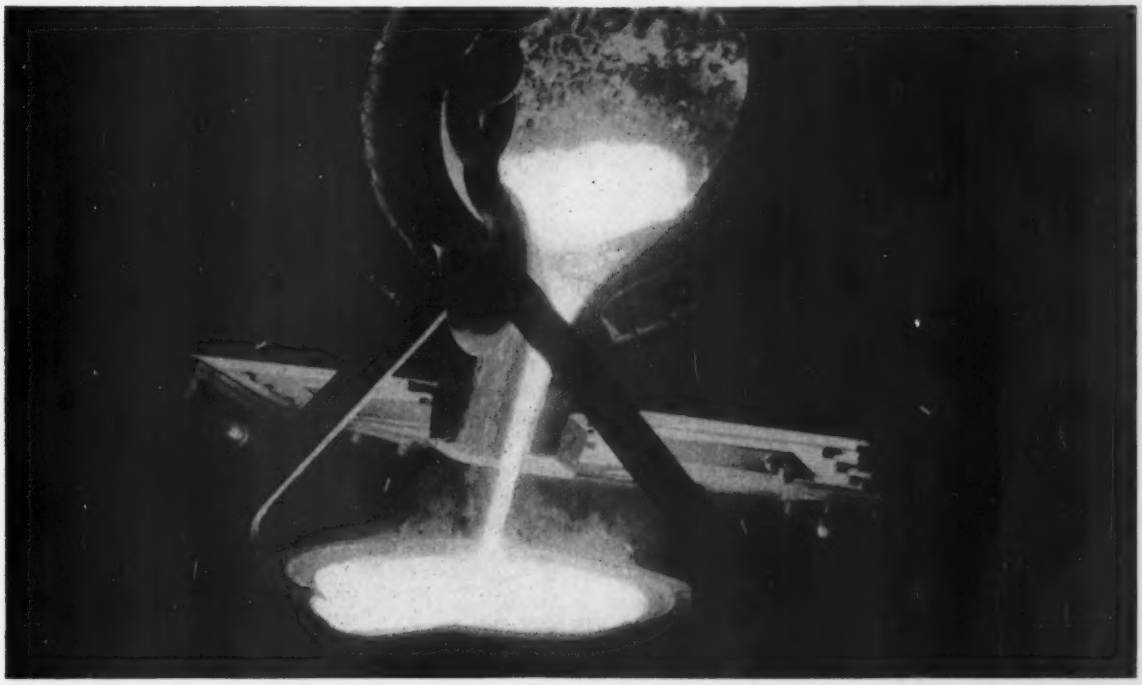
Add life to linings...

Norton MAGNORITE* fused magnesium oxide ramming mix rams easily to high uniform densities that provide extra long service life. Careful grain sizing minimizes segregation. Use wherever high refractoriness, inclusion-free melts, and low outgassing are "musts". Ideal for high frequency melting of alloy steels and high temperature alloys containing nickel/cobalt base; vacuum melting, etc. Proved performance record, in furnaces of all sizes.

Rammed Weight	172 lbs./cu. ft.
Grain Sizing	6F and finer
MgO	91.3%
Al_2O_3	5.2%
CaO	1.7%
SiO_2	1.5%
Fe_2O_3	.2%

For full information on ramming, sintering, etc., write NORTON COMPANY, Refractories Division, 305 New Bond Street, Worcester 6, Massachusetts.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



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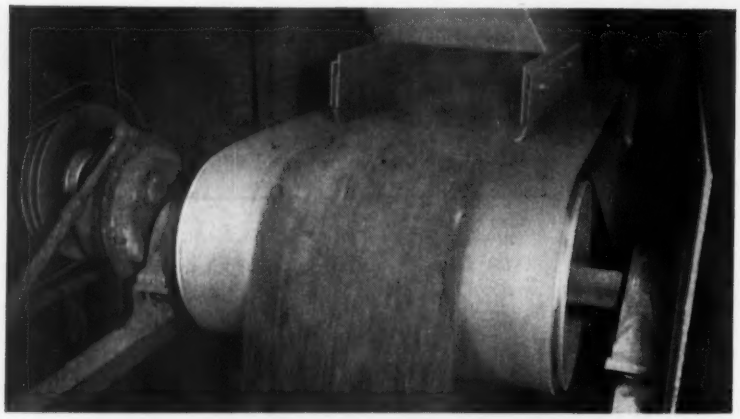
"STEARNS MAGNET PULLEY SAVES US $3,000 PER YEAR"

Says Foundry Superintendent



Here the Stearns Series 410 20x24 pulley, mounted in a pulley separator unit, removes tramp iron from foundry sand at Falls Foundry, Menomonee Falls, Wisconsin.

"No more damage to patterns"
"No more injury to workers' hands"

Falls Foundry, Menomonee Falls, Wisconsin, installed a new Stearns INDOX V permanent magnet pulley about a year ago. A. E. Lapp, foundry superintendent, states: "This Stearns unit is doing an outstanding job. We run about 125 tons of sand over the pulley every day, and pull out about a half to three-fourths of a ton of iron a day. Before we put this magnetic pulley in, we reclaimed the sand by means of a sand cutter and brush system. The first time we used the pulley, we pulled out about 6 tons of iron."

Saves patterns, workers' hands

Mr. Lapp estimated that before installing the pulley, the company had about $150 per month in pattern damage. This was due to chunks of iron that were left in the sand. Since putting in the Stearns pulley, they have not had a single bit of pattern damage. The same thing with injuries. Before the pulley, workers were constantly hurting hands and fingers on sharp iron bits. Now there are no cases of hand injury while working in the sand. Mr. Lapp further states: "We used to pay a salvage outfit $5 a ton of scrap metal to salvage it. Taking this saving along with our pattern saving, we're ahead about $3,000 a year. You couldn't take this pulley away from me."

No Electrical Cost

Find out how a new INDOX V magnet pulley can save you money. No electric cost — no maintenance cost — tremendous magnetic pulling power. Nothing matches this new INDOX V material. A Stearns representative can give you facts and figures. Write us today for nearest representative and new free literature. Specify Bulletin 1021G.

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Profit with Stearns — First with Ceramic Magnet Separators for Industry

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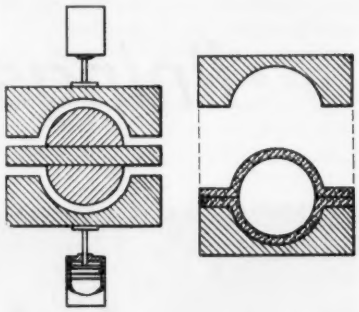
PATENTS

Of Interest to Foundrymen

Contour Shell Molds

New method of shell molding employs upper and lower contoured plates or boxes to form the cope and drag molds. The pattern in the form of a double-faced matchplate is located between the two contoured boxes with suitable spacing between pattern and boxes. Resin-bonded sand is blown into



those spaces from one or both sides depending on the mold size. Following blowing, the upper contour box is raised, carrying the shell mold with it, the pattern plate is removed, and a resin bonding agent is placed around the edges of the lower half mold. Upper contour box with its half mold is lowered over the lower half mold, and after the resin bond is polymerized, the joined molds are removed from the boxes. *Patent No.* 2,923,988 *granted to T. G. Baker.*

Die Mold Coating

Sticking of castings to the mold or die in pressure diecasting of aluminum alloys is prevented by applying thin coatings of low-molecular-weight hydrocarbon polymers such as polyethylenes and polyisobutylenes or mixtures thereof.

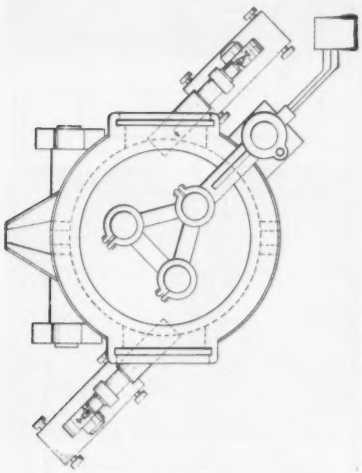
Polyethylenes with an average molecular weight of 1500 to 2000, and polyisobutylenes with an average molecular weight of 300 to 1000, have given good results. The former are wax-like and the latter are viscous liquids. In use the polymers usually are dispersed in suitable organic liquids such as kero-

sene, mineral seal oil, toluene, carbon tetrachloride, etc. so that they may be sprayed or brushed on the mold faces. Usual dispersion is 5 to 10 per cent of the polymer by weight in the organic liquid. *Patent No. 2,923,041 granted to J. W. Ryznar and assigned to Nalco Chemical Co.*

Facilitates Melting

Combination electric arc and oil or gas fired furnace arranged so that the heating means may be used individually or concurrently, reduces time and cost of melting metals. Also, if electric power fails, melting can be continued; the furnace can be kept hot between taps, and the slag can be refined without use of the electric arc.

New linings can be burnt in more

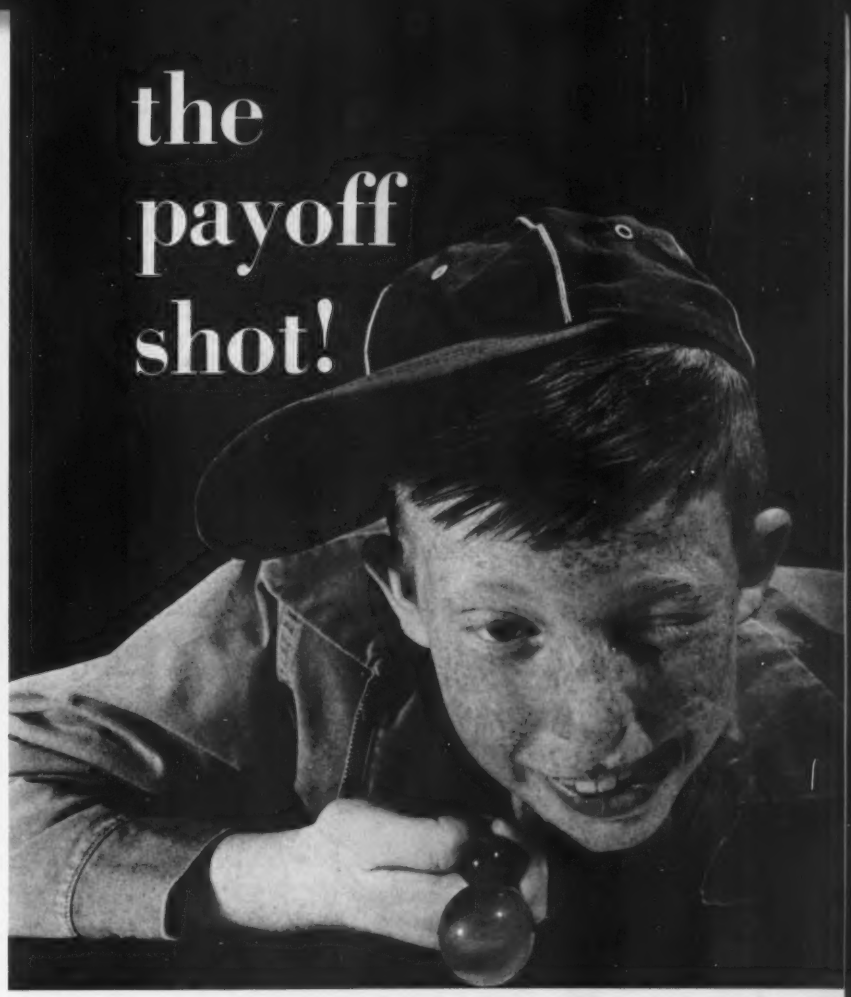


efficiently and with less thermal shock by use of oil or gas heating alone, and scrap charges can be preheated to facilitate melting by the electric arc.

As shown in the illustration, gas or oil burners which are movable fire through doors on opposite sides of the furnace. Burners provide temperatures of 2700 to 3150° F, with combustion products containing a negligible amount of oxygen in combinations which can combine with the charge. *Patent No. 2,927,-142 granted to M. D. La Bate and assigned to Ritetherm Inc.*

Spheroidal Graphite Iron

Cast iron containing nodular and spheroidal graphite and containing less than 0.04 per cent retained magnesium is produced by adding to the



AMASTEEL SHOT pays off for New England foundry!

Concerned about the cost of blast-cleaning grey iron castings, a New England foundry* compared performance of the malleable iron shot they had been using, with AMASTEEL shot, and with cast steel shot from another manufacturer. Results of the 7 months of tests: Consumption of malleable varied between 93¢ and $1.59 per wheel hour; the cast steel shot averaged $1.08 per wheel hour, and AMASTEEL *averaged 88¢ per hour!* Record-keeping and housekeeping were meticulous: Wheels and blades were kept in top shape; machines were purged between runs. And the payoff in dollars and cents was AMASTEEL! Castings were cleaned faster (ready for painting!)—at lower cost! One of 5 great abrasives made by a company with 25 years' experience, AMASTEEL can do wonders in *your* cleaning department, too!

**Name and case history on request.*

AMASTEEL

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ALLOY METAL ABRASIVE COMPANY

121 SOUTH DIVISION STREET
ANN ARBOR, MICHIGAN

Circle 687 on Page 53

The
HARRISON COR-BLO MACHINE,
BECAUSE OF ITS UNIQUE
TWO STATION DESIGN,
ACTUALLY DOUBLES PRODUCTION!

As you can see, the HARRISON COR-BLO is really two machines in one. It is available in 5 models, gas or electric, and may be completely automated or semi-automated. Accessories include a sand elevating system, and electrical signaling device. Note the automatic sand feeder; no shut-down time is required for filling the sand magazine. Core box life is extended because of low pressure blowing. Another advantage of the HARRISON COR-BLO is the utilization of many existing metal core boxes, easily converted to shell core production. The design of the machine is so simple, maintenance is reduced to a minimum. Write today to the manufacturer for additional information.

HARRISON MACHINE CO.

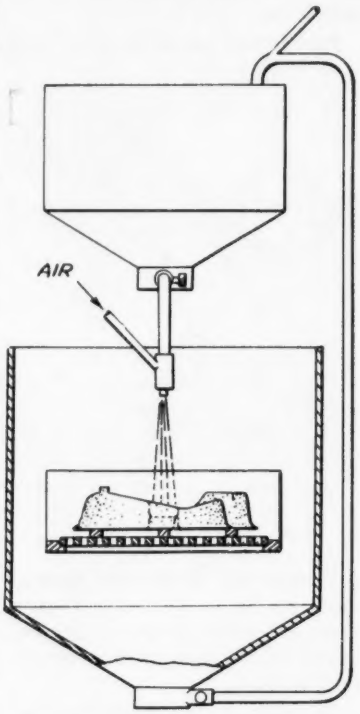
P.O. BOX W-67 Wesleyville (Erie) Pennsylvania

Representatives: L. T. Crosby Sales, Rocky River, Ohio
Bob Unsworth Associates, Redwood City, California
Jack Rhoads, New Process Engineering Co., Indianapolis, Ind.
Lancaster Foundry Supply Co., Lancaster, Pa.

molten iron a mixture of calcium silicide, calcium fluoride, and a magnesium alloy. Magnesium content of the latter alloy is in excess of that required to produce above 0.04 per cent retained magnesium in the iron. The calcium silicide and calcium fluoride act to limit the retained magnesium in the iron to less than 0.04 per cent. *Patent No. 2,922,713 granted to W. H. Moore.*

Definning Sand Cores

Removal of fins from baked sand cores can be accomplished by sandblasting under an air pressure of 2 to about 6 psi. The sand stream is directed substantially perpendicular



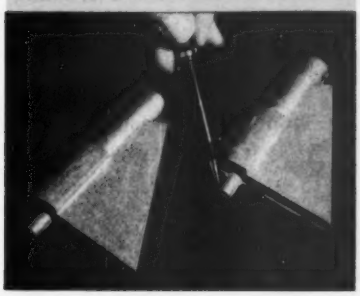
against a major surface of the fin projecting from the core and generally parallel to the surface of the core. Conventional sandblast nozzle having an orifice of $\frac{3}{8}$ in. diameter is particularly suitable for the operation. *Patent No. 2,929,120 granted to O. W. Brandt and P. West and assigned to General Motors Corp.*

Vibration Refining

Procedure for refining metals and alloys includes application of vibration. Metal is melted in a vacuum chamber under an effective pressure below 50 microns. As the metal be-

LARGE
OR
SMALL

The large cope and drag above and the small foundry tool parts below were made by laminating glass cloth with HYSOL Epoxy Tooling Materials.



ECONOMY PATTERN INC. FINDS HYSOL EPOXY TOOLING HELPS THEM OFFER BETTER, MORE ECONOMICAL TOOLS TO CUSTOMERS

With an outstanding reputation for quality tools, Economy Pattern Inc., Buffalo, N. Y., thoroughly tested HYSOL Epoxy Tooling Materials. Now they are making more and more tools with HYSOL. Large or small, they find HYSOL materials and techniques help them provide better tools at lower cost. To find out how HYSOL can help you cut costs write for complete information today.

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Circle 689 on Page 53

gins to liquefy it is vibrated at a frequency of 500 to 5000 cycles per minute at an amplitude of 1/64 to 3/32 in. until the desired pouring temperature is attained.

While still in the vacuum chamber the metal is poured into a mold vibrated in a vertical direction at a frequency of 500 to 5000 cycles per minute and an amplitude of 1/64 to 3/32 in. Vibration is continued until solidification is completed. Fine grain size can be obtained by vibrating the mold at 2500 to 35,000 cycles per minute and an amplitude of about 0.001 in. *Patent No.* 2,920,-362 *granted to D. Von Ludwig and assigned to Selas Corp. of America.*

Homogeneous Alloys

Difficulty in manufacture of aluminum-iron alloys containing more than 6 per cent aluminum is avoided by placing deoxidized and dehydrogenized aluminum in a thin-wall steel container located in a refractory-lined ladle. Molten deoxidized iron is poured into the aluminum with which it alloys and then punctures the steel container. Turbulence produced by the procedure results in a homogeneous alloy, and the steel container dissolving in the alloy produces a chilling effect which prevents disastrous erosion of the ladle refractories caused by exothermic heat solution of aluminum in iron. *Patent No.* 2,920,955 *granted to W. A. Goering, Y. P. Telang, and V. F. Zackay and assigned to Ford Motor Co.*

Coating Sand with Resin

Cold coating process for preparing resin-coated sand for mold or core making involves precoating the sand with a liquid agent and then adding powdered phenolic resin. The precoating agent is an organic ester of an organic acid from the group consisting of phthalic acid, sebacic acid, benzoic acid, maleic acid, adipic acid and mixtures thereof. The resin contains 90 per cent phenol formaldehyde and 10 per cent hexamethylenetetramine. Ratio of precoating agent to resin is in the range of 1:10 to 4:10 by weight. Mixing is accomplished in muller type units in from 5 to 30 minutes. *Patent No.* 2,912,406 *granted to F. W. Less, E. C. Roeck and J. C. Searer and assigned to Hooker Electrochemical Co.*

Thousands of extra pours per ladle, with less effort for the operator

the Spincraft STAINLESS STEEL ladle

for non-ferrous metal pouring

LIGHT
TOUGH
LONGER-LASTING

If you pour non-ferrous alloys, Spincraft ladles will save you replacement costs and make the job much easier. Designed to reduce operator fatigue by their lightness, balance, and non-spill shape, they resist burning-through as only stainless steel with its high critical melting point can do. Spincraft ladles come in 23 sizes, from ¼ lb. to 30 lb. molten metal capacity.

- 75% lighter than cast iron ladles
- Amazingly long life
- Shot-blasted for coating adhesion
- Deep conical form makes pouring easier, minimizes spillage
- Can be used for zinc and other metals without coating
- "Whack proof" handle arc-welded to reinforced cup edge
- Built to last longer, work lighter. Let your operator use one, then try to take it away from him!

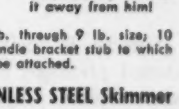
Complete handle on ¼ lb. through 9 lb. size; 10 through 30 lb. size has handle bracket stub to which proper length handle can be attached.

Also...Spincraft STAINLESS STEEL Skimmer

A skimmer that really skims! Shallow radius skims surface impurities instead of ladling as deeper-cupped skimmers do. Correct size holes prevent clogging. Short handle stubs fit common pipe and permit attachment of length and type handle you want.

IN FOUR DIAMETERS: 6 inch, 8 inch, 10 inch, 12 inch.

Spincraft ladles and skimmers are also available in low-cost mild steel.



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☐ Ladles	☐ Ladles
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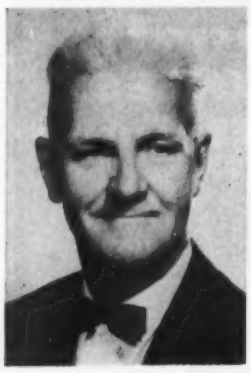
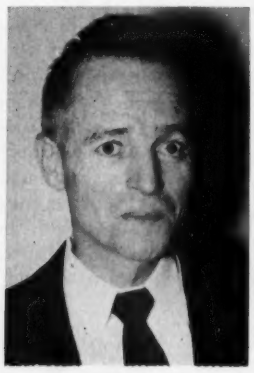
Circle 690 on Page 53

Men of Industry



ALEXANDER BECK
. . . heads Whitman Foundry

VERLE B. UTZINGER
. . . joins Sloan Valve Co.



WALTER JENKINSON
. . . becomes foundry supt.

JOHN T. HEGNER
. . . Sterling National pres.

Alexander Beck has been elected president, Whitman Foundry Inc., Whitman, Mass. With the company over 15 years, he has been general manager and assistant treasurer since 1947.

Verle B. Utzinger has joined Sloan Valve Co., Chicago, as assistant plant superintendent in charge of foundry operations. Recently he was superintendent of foundries, Walworth Co., Braintree, Mass.

Charles F. Seelbach Jr. has been elected president and general manager, Forest City Foundries Co., Cleveland. Others elected are **Charles F. Seelbach Sr.**, chairman; **William F. Seelbach**, first vice president; **Ralph G. Wieland**, second vice president, and **Walter Kremser**, secretary-treasurer.

Cyril B. Daws has been appointed field sales engineer, Zirconium Corp. of America, Solon, Ohio. As part of his training program he has been working in the company's fabrication department.

R. C. O'Kane, recently vice president, has been made president and general manager, Buckeye Steel Castings Co., Columbus, Ohio. He succeeds **R. H. Bonnet**, who becomes chairman of the board. **W. W. Heimberger**, formerly works manager, has been named vice president-operations, and **G. T. Johnson** Jr. vice president-sales. Other officers are **L. I. Day**, treasurer, and **W. J. Bennett**, secretary.

Walter Jenkinson, for 25 years with Fairmount Foundry Inc., Philadelphia, has been appointed foundry superintendent, H. G. Enderlein Co., there.

John E. McIntyre, vice president-general manager, Sibley Machine & Foundry Corp., South Bend, Ind., has been named vice president and member of the executive committee, Gray Iron Founders' Society, Cleveland, succeeding **J. E. Quest**, who has left the foundry industry. Mr. McIntyre was vice president of the society in 1948.

Randolph L. Ruhley, formerly vice president-general sales manager, Branford Co., New Britain, Conn., has been appointed field manager of sales and development, Martin Engineering Co., Neponset, Ill.

Charles W. Marchmann has been appointed eastern regional sales manager, Little Giant Products Inc., Peoria, Ill., with headquarters in Cincinnati.

Roger Snellman, sales representative in Los Angeles, has been named Detroit district sales manager, Harbison-Walker Refractories Co., Pittsburgh.

John T. Hegner has been named president, treasurer, and a director of Sterling National Industries Inc., Milwaukee. With the company 23 years, he succeeds **Richard A. Smith**, who has become chairman of the board. **Norman L. Schmeichel**, executive vice president, in addition has been assigned Mr. Hegner's former duties as secretary. **Melvin P. Pederson** has become assistant treasurer. He continues as assistant secretary.

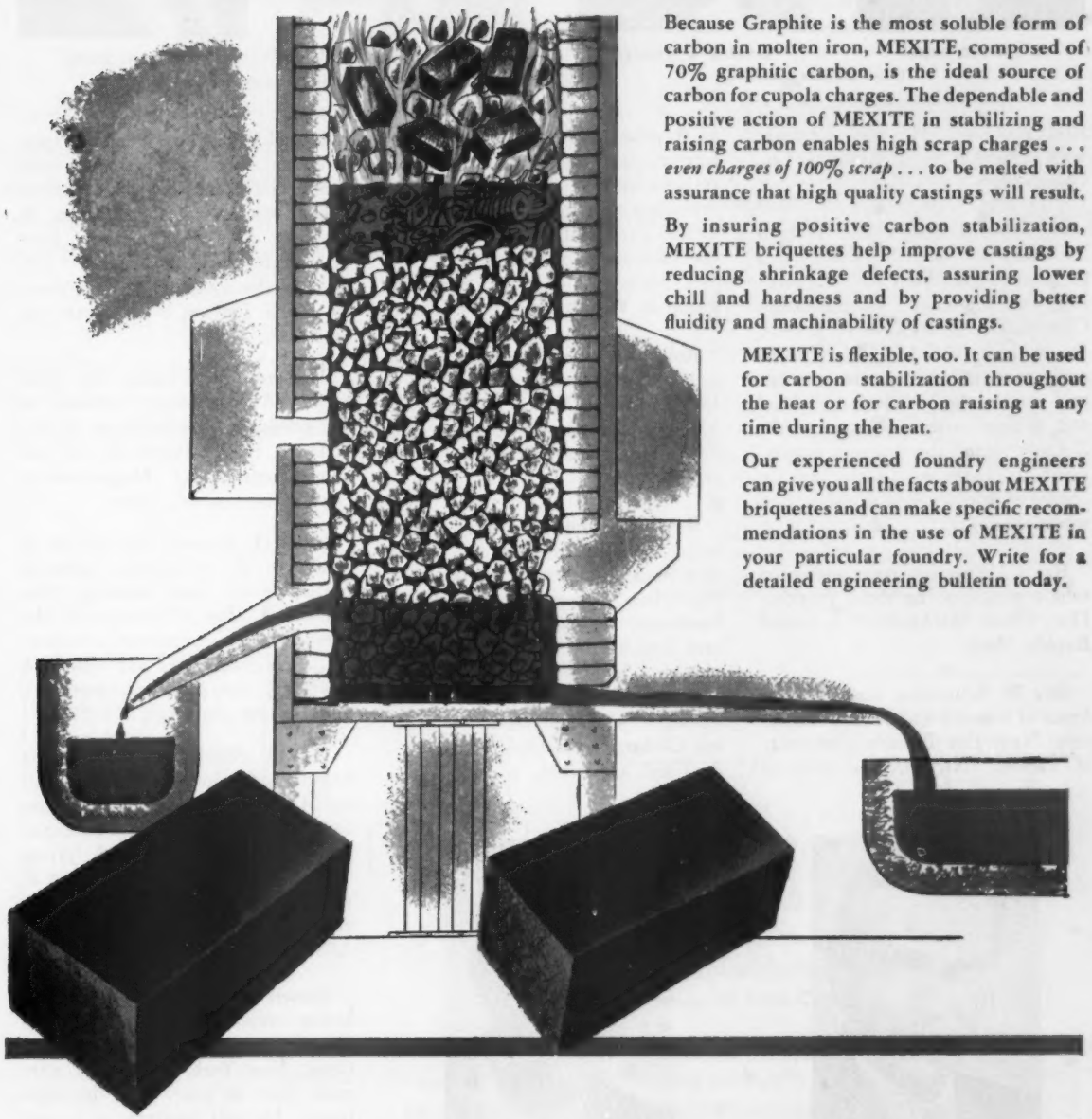
James F. Stevenson recently joined Newton-New Haven Co., West Haven, Conn., as technical representative. He has been in the die-casting industry for many years.

W. E. Mason, assistant superintendent, has been named superintendent of the foundries, Air Brake Div., Westinghouse Air Brake Co., Wilmerding, Pa. He joined the company in 1926.

E. C. McDonald has been appointed technical director, Tamms Industries Co., Chicago. He was formerly technical director and production supervisor, Industrial Paint Mfg. Co., Birmingham.

E. G. Tetzlaff, formerly with Pelton Steel Castings Co., Milwaukee, has been named assistant plant manager, Texas Foundries Inc., Lufkin, Tex. **Charles J. Angers** has been named superintendent of the

YOU CAN CHARGE MORE SCRAP IRON AND GET HIGH QUALITY CASTINGS WITH MEXITE® (GRAPHITE BRIQUETTE)



Because Graphite is the most soluble form of carbon in molten iron, MEXITE, composed of 70% graphitic carbon, is the ideal source of carbon for cupola charges. The dependable and positive action of MEXITE in stabilizing and raising carbon enables high scrap charges . . . *even charges of 100% scrap* . . . to be melted with assurance that high quality castings will result.

By insuring positive carbon stabilization, MEXITE briquettes help improve castings by reducing shrinkage defects, assuring lower chill and hardness and by providing better fluidity and machinability of castings.

MEXITE is flexible, too. It can be used for carbon stabilization throughout the heat or for carbon raising at any time during the heat.

Our experienced foundry engineers can give you all the facts about MEXITE briquettes and can make specific recommendations in the use of MEXITE in your particular foundry. Write for a detailed engineering bulletin today.

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DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDER METALLURGY • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

Circle 691 on Page 53

H. EDWARD EHLERS

WARREN A. ZIMMER

. . . Dixon Crucible executives

DANIEL E. WATKINS

ROBERT N. VOIGT

. . . U. S. Pipe & Foundry vice presidents

steel division. He was formerly with Crucible Steel Castings Co., Cleveland.

H. Edward Ehlers and **Warren A. Zimmer,** formerly senior vice presidents, have been elected executive vice presidents, Joseph Dixon Crucible Co., Jersey City, N. J. With Dixon since 1935, Mr. Ehlers previously was manager of the crucible and refractories division, industrial and general sales manager. Mr. Zimmer joined the research department in 1936, and later was in charge of the crucible division, and works manager.

Ray C. Wing has been appointed sales manager of the Metal Working Div., Oliver Machinery Co., Grand Rapids, Mich.

Roy W. Schroeder, associate professor of foundry and pattern laboratory, Navy Pier Branch, University of Illinois, Chicago, was tendered a surprise testimonial dinner by former students and apprentice trainees on Apr. 30. Among the 28 attending were former students from Crane Technical High School and the University of Illinois, and former members of the apprentice group at Washburne Trade School.

Robert C. Heine has been elected president, Westlectric Castings Inc., Los Angeles. **Walter E. Anderson** has been named vice president and **Paul P. Bergmann** vice president of sales.

Roy W. Bennett, in charge of material sales, was elected vice president and a director, Walter Gerlinger Inc., Milwaukee. **Donald M. Gerlinger,** in charge of equipment and engineering sales, was named vice president, treasurer, and a director. **Thelma Wellner,** office manager, was made secretary. **Walter Gerlinger** was re-elected president and a director.

Daniel E. Watkins, general superintendent, blast furnaces and coke ovens, and **Robert N. Voigt,** general works manager, U. S. Pipe & Foundry Co., Birmingham, have been named vice presidents. Officers of the company were re-elected. **C. S. Lawson** is chairman and president.

Theodore R. Kennedy has been appointed engineering assistant to the president, Inductotherm Corp., Delanco, N. J. Previously he was chief engineer of Magnethermic Corp., Youngstown, Ohio.

Cleve H. Pomeroy has retired as chairman of the board, National Malleable & Steel Castings Co., Cleveland, after 40 years with the company. He continues as a director. Previously he was treasurer, secretary, vice president, president, and became chairman in 1959.

W. D. McMillan has become foundry consultant, Ohio Ferro-Alloys Corp., Canton, Ohio. He recently retired from International Harvester Co., Chicago. A former chairman of the Chicago Chapter of the American Foundrymen's Society, he is a past national director of AFS.

Russell Franks, manager of marketing research, Union Carbide Metals Co., Div. of Union Carbide Corp., New York, has retired after more than 40 years with the company. He will continue as a consultant.

Saxton W. Fletcher, since 1944 president, J. O. Ross Engineering Div., retired recently. One of the founders of the company, he was

FRANK V. JASIENSKI

RICHARD H. DOBBINS

Mr. Jasienski was named Muncie, Ind., Div., plant manager, Albion Malleable Iron Co., Albion, Mich., and Mr. Dobbins plant manager at Albion, as reported in April

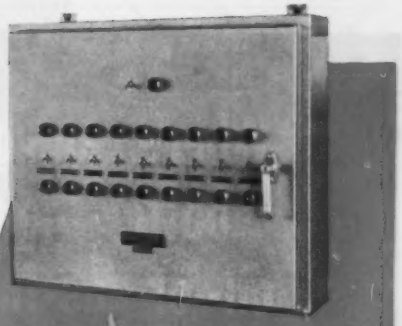
HARTLEY ▸ the FIRST / the FOREMOST / the FINEST

Hartley Sand Controller, Series XII, operates all — or any combination of:

Moisture Controls • Mixer Timers • Bond Feeders • Bin Controls • Mixer Selectors Pneumatic Transporters

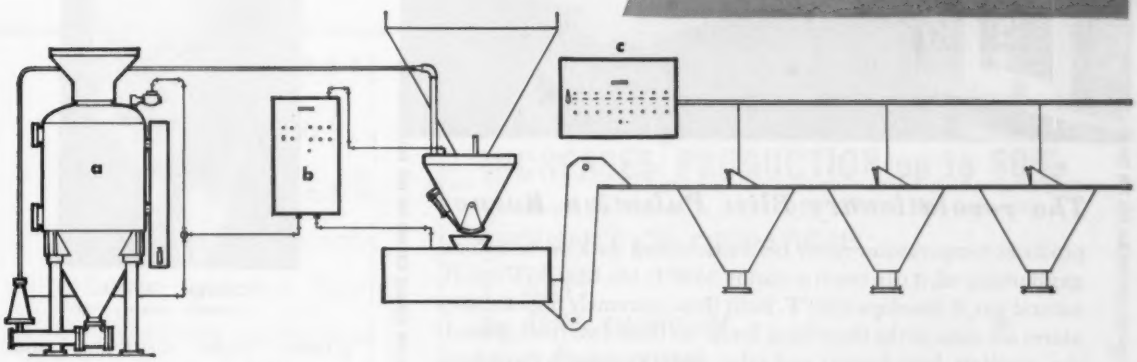
. . . in complete Foundry Sand Automation

A single Hartley control cabinet *delivers* the precision impulses that remove guesswork, loss of time and lack of uniformity in foundry sand systems. From transporting raw sand to the control of moisture, bond additions and cycling in the sand reconditioning process, there is no waiting, no waste, no wondering. What's more, it is not necessary to automate your complete operation at once. Hartley equipment can be added and interlocked in stages. Let the savings from one unit pay for another until your sand system is fully automated.



HARTLEY SAND LEVER CONTROL SERIES 45

This unit ("c" in drawing) automatically controls the production of sand from mixer and its distribution to multiple moulder hoppers. The series 45 also distributes surplus sand into multiple hoppers and eliminates spill sand from going over end of belt.



Line drawing shows a typical Hartley installation:
(a) Bond Feeder, (b) Series XII Sand Controller, (c) Sand Level Control.

Complete specifications and recommendations concerning special problems will be sent promptly.

HARTLEY *Controls* CORPORATION • NEENAH • WISCONSIN

Circle 692 on Page 53

previously secretary and vice president. He was vice president of Midland-Ross Corp., the parent company, New York, until 1958, when he was made vice chairman of the board. He continues as a director of Midland-Ross.

Arthur C. Reppenhagen, sales manager, and **Harlow G. Jones,** director of research and product development, were elected vice presidents, Mid-West Abrasive Co., Owosso, Mich.

James C. Dangler, formerly assistant to the president, Oster Mfg. Co., Cleveland, has joined Cooper-Bessemer Corp., Mt. Vernon, Ohio, as sales engineer in the East-Central district.

W. C. Fobbe has been appointed sales manager, Permanent Mold Die Co., Detroit, and Piston Mold Die Co., Warren, Mich. Previously he was with Aluminum Co. of America, Pittsburgh, and Bohn Aluminum & Brass Corp., Detroit.

The revolutionary Bliss Pulsation Burner

produces temperatures never before achieved with oil or natural gas. Burning oil, it can reach a searing 3450°F. On 1000 BTU/cu. ft. natural gas, it develops 3320°F. Both these extremely high temperatures are close to the theoretical limits for these two fuels. Foundries, smelters, heat treaters and other metal processers have been quick to take advantage of the remarkable combustion efficiency of these new burners. To them, it has meant faster heating cycles, cleaner flue gases, and above all, fuel economy that cuts from 12% to 30% from their furnace overhead. Not to speak of reduced maintenance on refractory linings.

To learn how the Bliss Burner can increase the heat output in your plant while it's saving you money in fuel and furnace maintenance, write today for our Bulletin No. 60. It's yours for the asking.

BLISS
SINCE 1857

E. W. BLISS COMPANY
Canton, Ohio
BLISS is more than a name—it's a guarantee

Kenneth A. DeLonge has been named manager of direct sales, and **Robert E. Savage,** foundry industry manager, Primary Nickel Dept., International Nickel Co., New York. With Inco since 1937, Mr. DeLonge served in the Development and Research Div., and became supervisor

KENNETH A. DeLONGE
. . . mgr. of direct sales

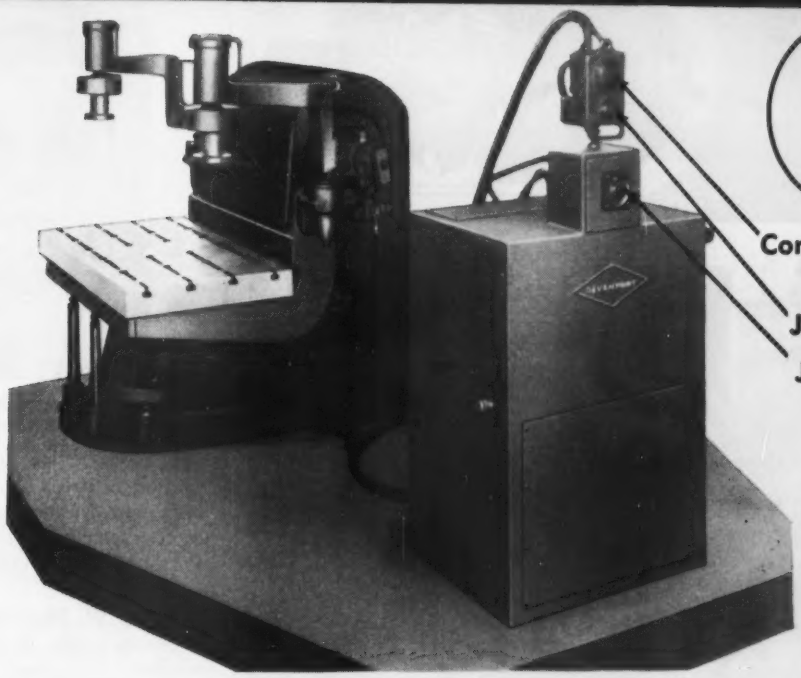
of its castings section in 1955. After transfer to the Primary Nickel Dept. in 1958 he became Pittsburgh sales manager. Mr. Savage joined the company's Ductile Iron Section in 1949, and later became head of

ROBERT E. SAVAGE
. . . foundry industry mgr.

primary nickel distributor sales. Since 1958 he has been handling foundry industry sales and assisting in sales distribution. In other changes in the Primary Nickel Dept. transfers include **J. R. Davis** to the Central Atlantic Coast office in Wilmington, Del.; **D. C. Dawson** to Pittsburgh; and **A. E. Smith** to Chicago.

Ward Hunt, foundry operations and sales manager, has been named foundry sales manager, Dexter Div., Fairfield, Iowa, division of Philco Corp., Philadelphia. **Robert L.**

The First COMPLETELY AUTOMATIC, Fully Air Operated JOLT-ROLL-OVER DRAW Molding



FOUNDRYMEN

We thank you...

for visiting our exhibit to see the new automatic roll-over—and for your overwhelming acceptance of this first all-air, automatic jolt-roll-over molding machine.

This new "DAVENPORT" automatic Roll-Over makes a molder out of a laborer in a short time. Built to take a beating. Practically dust-proof. Dehydrates air used. Self oiling.

RESEARCHED and TESTED

INCREASES PRODUCTION up to 50%

Available in 3 sizes — 1000, 1500, 2500 lbs. capacity

SEQUENCE OF OPERATIONS

1. JOLTS
2. ARMS SWING IN
3. CLAMPS FLASK
4. ROLLS OVER
5. RAISES AND LEVELS DRAW CYLINDER
6. VIBRATOR OPERATES
7. UNLOCKS FLASK CLAMPS AND SWINGS OUT
8. DRAW TABLE LOWERS
9. ROLL OVER RETURNS TO NEUTRAL POSITION

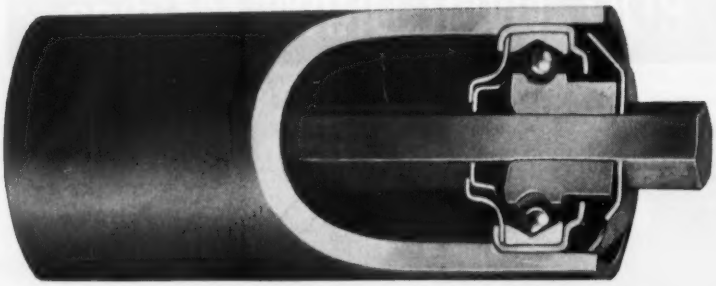
DAVENPORT MACHINE AND Foundry Company

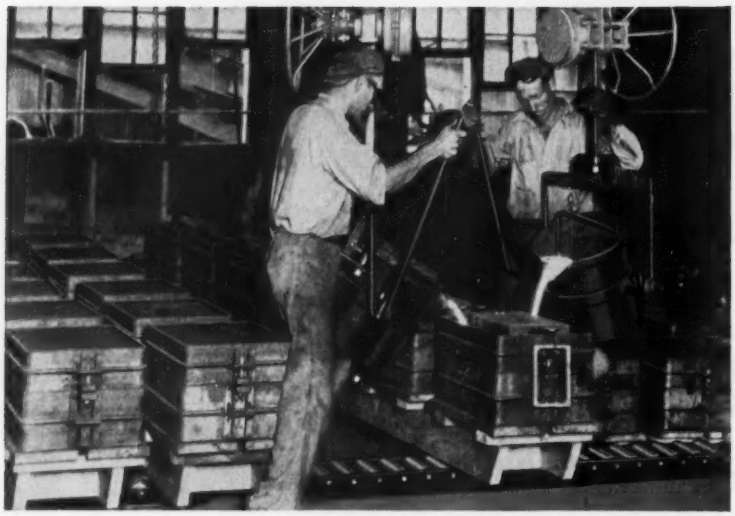
DAVENPORT IOWA

Circle 694 on Page 53

STANDARD'S SHIELDED BEARINGS

Grease-packed against dirt and corrosion—ideal for Foundry Conveyor Service





Move molds faster with less vibration and metal spillage on Standard roller conveyors — equipped with Standard's shielded, grease-packed bearings, protected against sand, dirt, and metal damage.

Standard's bearings are specially engineered for heavy duty foundry service . . . protective shielding keeps dirt from entering bearing. They are grease-packed at the factory for added protection and minimum maintenance. Provision made for regreasing to flush bearings.

Standard has been designing and manufacturing foundry conveyors since 1906 — a good reason why you can depend on Standard equipment to move foundry tonnage faster, safer, more profitably.

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Send for Standard's new, fully illustrated catalog, "Standard Conveyors Engineered for Faster Production" — a valuable reference book describing the many applications of Standard Conveyors for diversified industry. Address Dept. N-6.

Standard
GRAVITY & POWER
CONVEYORS

OVER 50 YEARS OF CONVEYOR EXPERIENCE

Funkhouser, assistant foundry manager, has been made foundry manager. **Chet Manley**, foundry engineer, has been appointed foundry superintendent, succeeding **Roy Ray**, resigned.

John D. Tournaud has been appointed refractories sales manager, Detroit district, Babcock & Wilcox

JOHN D. TOURNAUD
. . . district sales mgr.

Co., New York, succeeding **F. B. Cornell**, retired. Mr. Tournaud has been with the company since 1953 as refractories sales engineer in Pittsburgh and Detroit.

Glenn W. Merrefield has joined Westover Corp. & Associates, Milwaukee, for plant modernization

GLENN W. MERREFIELD
. . . joins Westover Associates

and layout services. Until recently he was in the foundry engineering division, Giffels & Rosetti, Detroit.

Harry A. Twist has joined Walsh Refractories Corp., St. Louis, as sales representative.

Norbert B. Blaski has been named superintendent of Plant 2, American Foundry Plant, Chrysler Corp., Indianapolis. He was formerly

quality control manager there. **F. L. Falater**, who joined the company last year, is personnel development administrator.

L. John Harwood has been appointed sales manager, Alloy Steel Casting Co., Southampton, Pa. He

L. JOHN HARWOOD
. . . joins Alloy Steel Casting

was formerly with Electro-Alloys Div., American Brake Shoe Co., Elyria, Ohio, and Midvale Co., Philadelphia.

Drew Graham has been appointed superintendent of Fairmount Foundry Inc., Philadelphia.

Sheldon K. Towson Jr., vice president, Elwell-Parker Electric Co.,

SHELDON K. TOWSON JR.
. . . Elwell-Parker promotion

Cleveland, has also been made general manager.

Joseph L. Dow, New England district sales engineer, Elyria Foundry Div., Chromalloy Corp., Elyria, Ohio, has moved to Pittsburgh, where he will also cover Pennsylvania sales.

Paul Suttman, art instructor in the College of Architecture and Design, University of Michigan, has

Reduce Costs . . . Improve Quality

Foseco®
chemical and metallurgical compounds for the foundry industry

Some of the more popular of the many compounds available to the foundry industry are listed in the table below. All are conveniently packaged and available for fast delivery.

PRODUCT	TRADE NAME	APPLICATION
MOLDABLE EXOTHERMIC COMPOUNDS—for increased yield and feeding efficiency	Feedex®	For all metals and alloys
RISER HOT-TOPPING COMPOUNDS—Insulating/exothermic Exothermic/metal producing	Feedol Ferrux Kalmex	Aluminum and copper base alloys Iron and steel Iron and steel
PROTECTIVE AND DROSSING FLUXES—for reducing metal loss and eliminating oxide inclusions	Coveral Cuprit Albral Plumbral Zinc Coveral Plumbrex	Aluminum base alloys Copper base alloys Aluminum, manganese and silicon bronze alloys High leaded bronze Zinc base alloys Lead base alloys
DEGASSERS—for cleansing and removal of harmful gases	Degaser Cuprex Logas Regenerator Ferrogen	Aluminum and magnesium alloys Copper and nickel alloys Copper and nickel alloys Copper and nickel alloys Gray, malleable and high nickel cast iron
DEOXIDIZERS—for controlled deoxidation and increased fluidity	Deoxidising Tubes	Copper base alloys
GRAIN REFINING COMPOUNDS	Nucleant	Aluminum base alloys
COATINGS—for cores, molds, dies, tools, ladles	Moldcote Terracote Terrapowder Firit	Volatile type core and mold coatings for all metals Water base mold and core coating for iron and non-ferrous metals High quality graphite-refractory coatings For ladles and furnace tools
MISCELLANEOUS	Ladelloys Corfix CO_2 Set Inoculant	Alloying additives for iron and steel Core joining compound Core and mold binder for use in CO_2 process Inoculating compound for iron

A world-wide organization serving the chemical and metallurgical needs of the entire metal casting industry.

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P. O. Box 8728 • Cleveland 35, Ohio • Telephone: BErea 4-3551

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EXOTHERMIC RISER COMPOUNDS
PROTECTIVE AND DROSSING FLUXES
DEGASSERS — ALLOYING ADDITIVES
COATINGS — DEOXIDIZERS
INOCULANTS — GRAIN REFINERS

been granted leave. He has received a research grant from the Horace H. Rackham School of Graduate Studies for research in bronze casting techniques in Italy.

William F. Boyle has been elected a vice president of General Metals Corp., Oakland, Calif. He joined the company early this year.

Gordon Campbell, formerly with St. Paul Foundry & Mfg. Co., St. Paul, as foundry and machine shop manager, is now foundry superintendent, J. F. Quest Mfg. Co., Minneapolis.

William D. Cameron, formerly manager of production engineering, Lincoln-Mercury Div., Ford Motor Co., Dearborn, Mich., has been named general manager of the Cleveland Graphite Bronze Div., Clevite Corp., Cleveland. He succeeds **William W. Brown,** who recently became vice president of Clevite's Bearing group.

A. Norman Swanson has been named manager of sales at General Electric Co.'s Everett, Mass., foundry. He will handle sales of foundry's products outside of GE's own departments.

Frank H. Dettore, former director of development, has been elected a

FRANK H. DETTORE
. . . G. E. Smith v. p.

vice president of G. E. Smith Inc., Pittsburgh. He has been with the company five years.

H. S. Faust has been named chairman of Hansell-Elcock Co., Chicago. **George R. Winter,** executive vice president, has succeeded Mr. Faust as president.

Joseph C. McIlhargey recently joined Superflux Mfg. Co., Allen Park, Mich., as Detroit sales engi-

JOSEPH C. McILHARGEY
. . . joins Superflux Mfg. Co.

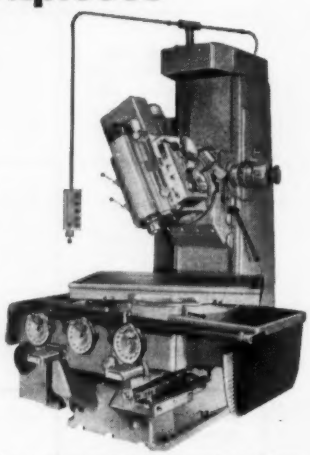
neer. He was in refractory sales with Babcock & Wilcox Co., New York.

John R. Anderson has been named San Francisco district manager, Industrial-Automotive Div., Black & Decker Mfg. Co., Towson, Md., succeeding **Paul Pounds,** on leave of absence. **Harold E. Bank-**

Avoid Double Handling of Large, Heavy Workpieces

with a BOKOE F3
Universal Miller

Save costly set-up time and avoid transferring bulky workpieces from one machine to another —with the BOKOE F3 Universal Milling and Boring Machine. On one, versatile machine you can now perform boring, milling and drilling—often on 5 sides—without re-setting the workpiece. The remarkably flexible operation of the BOKOE F3 is especially suited for the machining of ferrous and non-ferrous castings, dies, molds, and metal and wooden patterns. Check these many BOKOE features for *your* production needs . . .



Rotary milling on large component.

- Coordinate positioning of rotary worktable with steplessly adjustable feeds for transverse, longitudinal and rotary movements—operating either individually or simultaneously. Rapid travel for all three directions.
- Clamping area up to 63" x 31.5". Longitudinal movement up to 72", transverse movement up to 28". Maximum workpiece diameter for circular and radius milling, up to 98". Maximum distance, main spindle to column, 48".
- Stepless spindle speeds from 36—1800 rpm. Six spindle feeds from .0016 to .016 in./revolution. Spindle slide rotates 90° in either direction. Entire column rotates 360°.
- All electrical equipment in accordance with J.I.C. standards.

Head turned 90° with right-angle milling attachment.

Write For Information

COSA — *Importers of Leading Precision Machine Tools* — *Nationwide Sales and Service* — COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

IN CANADA contact COSA CORP. OF CANADA, LTD., 1160 Lakeshore Rd., Long Branch, Toronto 14, Ont.

head replaces Mr. Anderson as Seattle district manager. **Robert L. Tietjen** has been made sales representative in New York for the division, the former position of **Thomas A. McCarthy Jr.**, resigned.

Robert C. Stokes, elected chairman of the Philadelphia Chapter of the American Foundrymen's Society

ROBERT C. STOKES
. . . AFS chapter chairman

for 1960-61, is vice president and general manager, Crown Non-Ferrous Foundry Inc., Chester, Pa. Until 1957 he was plant manager, Philadelphia Bronze & Brass Co., Philadelphia.

S. L. Jackson, for the past year assistant manager of the eastern region, Union Carbide Metals Co.,

S. L. JACKSON
. . . becomes division mgr.

Div. of Union Carbide Corp., New York, has been named manager, with headquarters in Phillipsburg, N. J. He was previously Los Angeles and New York district manager.

Wesley Allred, general foreman, the Colonial Foundry Co., Louisville, Ohio, has been made acting senior general foreman. **Harry**

Foundrymen and steel men! Princess Wenatchee and Junior are campaigning to get your vote for Chief Keokuk, standard bearer of the Kemco Silvery party. Kemco Silvery deserves your consideration. It is the superior form of silicon introduction. It rates your vote because it tops all other candidates for economy and performance. When you think of Silicon . . . think of KEMCO!

KEMCO SILVERY PIG IRON

SILICON METAL - OTHER FERROALLOYS

Kemco Silvery melts evenly, holds silicon loss to a minimum, handles easily by magnet or count. Your choice of 60 lb. or 30 lb. pigs or 12½ lb. piglets in regular or alloy analysis for iron and steel production. Read the free booklet, "For Lower Costs, Higher Quality Products." Send for your copy now. Also check the performance of Kemco Silicon Metal in aluminum!

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Division of Vanadium Corporation of America
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3504 Carew Tower, Cincinnati 2, Ohio
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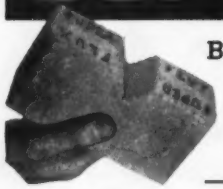
Circle 698 on Page 53

WHY DO THINGS THE HARD WAY?

SUPERFLUX in the cupola means fewer shut downs, hotter and more uniform iron, cleaner drops. Store it outdoors; it's weatherproof.

LADLE FLUX in the alloying ladle means easier skimming, less slag build-up, longer refractory life. Non-toxic.

SUPERFLUX®



Briquetted Cupola Flux

SUPERFLUX MFG. CO.

16125 Cleophus Pkwy. Allen Park, Michigan

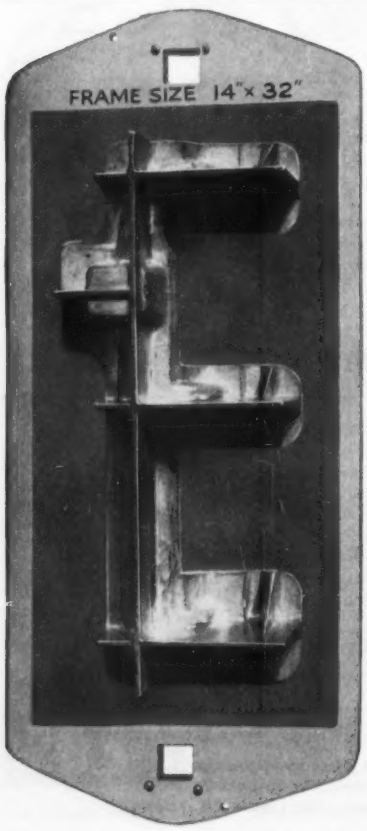
Sales Agents

MILLER AND COMPANY Chicago Cincinnati St. Louis

HICKMAN WILLIAMS & CO. Philadelphia New York Cleveland Pittsburgh

SCOTT BRIQUETTED PRODUCTS Welland, Ontario

Circle 699 on Page 53



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Let's talk increased production!

Let's talk about . . .

TAMASTONE

PATTERN COMPOUND

The Drier pattern at left is for air intake diesel manifold made from an original master pattern. *Only one skrinkage!* Material is aluminum. Pattern was used for 50 Driers. Only 3 hours labor and 35 pounds of TAMASTONE were required. Up to 1,000 castings have been made from a plate of this type!

No special skill needed to increase production 400% or more! . . . WRITE . . .

TAMMS INDUSTRIES CO.

228 N. LaSalle Street

Chicago 1, Illinois

Circle 700 on Page 53

Roller, vice president of the Foundry Div. who for many years has also been senior foreman, has relinquished the latter title.

HERBERT L. MARTIN
. . . joins Arcair Co.

Herbert L. Martin has joined Arcair Co., Lancaster, Ohio, as field representative in the Central States.

Larry Berger recently joined G. E. Smith Inc., Lancaster, Pa., as sales representative.

Earl Shaw, general foreman, has been named foundry superintend-

EARL SHAW **SHELDON W. HUGHES**

ent, Hale Fire Pump Co., Conshohocken, Pa., succeeding **Sheldon W. Hughes,** who has retired.

L. C. Rathsburg has retired as vice president in charge of the Chicago office, Lakeside Malleable Castings Co., Racine, Wis., after 40 years with the company.

J. M. Crockett has been appointed vice president-gases, Air Reduction Sales Co., New York. With the company since 1945, he was formerly Birmingham district manager.

Carl S. Weyandt, one of the founders and since 1937 president, Syntron Co., Homer City, Pa., retired recently after more than 40

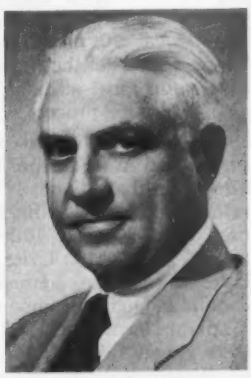
years of service. **Byron K. Hartman,** who joined the company last year as executive vice president and general manager, has succeeded Mr. Weyandt.

Wallace Olson, former quality control manager and metallurgist for Chrysler's Dodge Div., Detroit, has joined American Metallurgical

WALLACE OLSON
. . . joins American Met

Products Co., Pittsburgh, as Michigan sales engineer with headquarters in Flint.

William J. Bennett has been named field sales manager of the Coated Abrasives Div., Behr-Manning Co., Troy, N. Y. With the



WILLIAM J. BENNETT
. . . field sales mgr.

company 21 years, he has been manager of product engineering and industrial trade sales since 1950, and for the past five years eastern regional sales manager of coated abrasives.

Richard A. Cabell, Albert P. Gagnebin, Ralph H. Waddington, and **James C. Parlee** have been elected vice presidents, International Nickel Co. of Canada Ltd. **Paul Queneau** was named technical assistant to the president.

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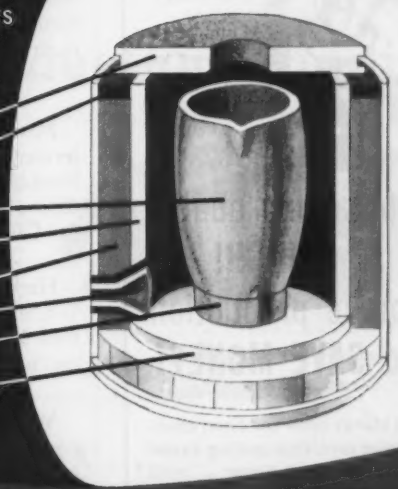
WHAT DOES "DIXONize" MEAN?

It means, literally, to add efficiency, economy and full control to your melting operation.

The products made by Dixon for crucible furnaces are backed up by 133 years of experience. The latest and most modern research and manufacturing techniques are employed to give maximum effectiveness and long life.

DIXON QUALITY PRODUCTS FOR YOUR CRUCIBLE FURNACE:



Are you interested in getting better castings at lower costs? If so, DIXONIZE YOUR FURNACES.

For Full Details fill out Coupon and mail today.

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THE JOSEPH DIXON CRUCIBLE CO., Jersey City 3, N. J.

Gentlemen: *Crucible Division Dept. F-2*

☐ Please send me further information and specification sheets on your crucibles.
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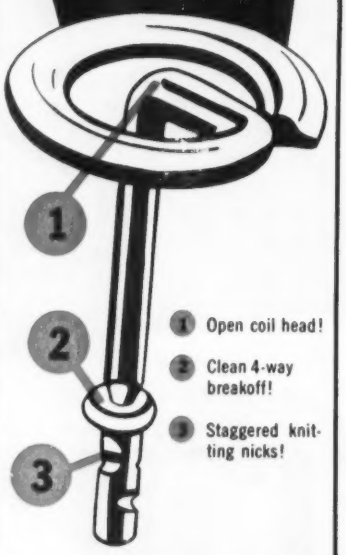
CITY_____ ZONE____ STATE_____

Circle 701 on Page 53

these CLEVELAND CHAPLET features



keep casting quality **HIGH!**
improve production and **SAVE MONEY!**

These sturdy open coil head chaplets make precision casting easier because they pack firmer . . . hold core position.

They leave no voids . . . and finally, they break off cleaner. What's more, they cost no more than ordinary plate heads.

Handy chaplet guide! Ask for new Chaplet Catalog Today.

THE Cleveland CHAPLET & MFG. CO.
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Obituary

Lloyd C. Farquhar, 72, retired works manager, American Steel Foundries, East St. Louis, Ill., died Apr. 4. He joined the Granite City, Ill., plant in 1910. From 1914 he was with Allegheny Steel Co., Pittsburgh, until World War I service. In 1920 he rejoined American Steel Foundries, and became works manager in 1939. Mr. Farquhar was a national director of American Foundrymen's Society from 1949-1952.

Richard J. Aylward, 30, vice president and plant manager, Neenah Foundry Co., Neenah, Wis., died May 1.

J. Irvin Hogan, 61, foundry management consultant, died May 2, in an automobile accident near Ottawa, Ill. Mr. Hogan was with Williams Management Engineering, industrial engineering services, and Westover Corp., Milwaukee.

Mrs. Lydia A. Pleukarp, 78, former president of Atlas Brass Foundry, now Atlas Simplex Corp., Columbus, Ohio, died May 10, in Ft. Lauderdale.

Herbert E. White, 50, owner of White Industries Inc., Cleveland, died May 9. He organized the die-casting firm in 1958.

William R. Moore, 69, former vice president, Norton Co., Worcester, Mass., died May 12 in Clearwater, Fla., his home since he retired in 1956.

William M. Duncan, 87, former president, Duncan Foundry & Machine Works, Alton, Ill., died Apr. 11.

I. G. Grawoig, 68, chairman of the board, Atlas Foundry Div., American Well Works, Aurora, Ill., died Apr. 27, in Los Angeles.

Merle F. Koblish, 54, sales manager at the General Chemical Div., Allied Chemical & Dye Corp., New York, died May 1. He had been with the division 31 years, and was

PQ offers the widest choice of silicates (over 70 products; 25 dry forms). You get the right one to insure the most efficient performance in your process.

Available coast to coast from plants located in Anderson, Ind.; Baltimore, Md.; Buffalo, N. Y.; Chester, Pa.; Jeffersonville, Ind.; Kansas City, Kansas; Rahway, N. J.; St. Louis, Mo.; Utica, Ill. and from associate companies, Philadelphia Quartz Company of Calif. plants located in Berkeley and Los Angeles, California; Tacoma, Wash.; National Silicates, Ltd., with plants in Toronto and Valleyfield, Canada.

All of this plus the benefit of a century's experience in silicate manufacture and uses.

When you need silicate information, test samples or prices, call PQ (telephone Philadelphia MArket 7-7200).

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PQ SOLUBLE SILICATES
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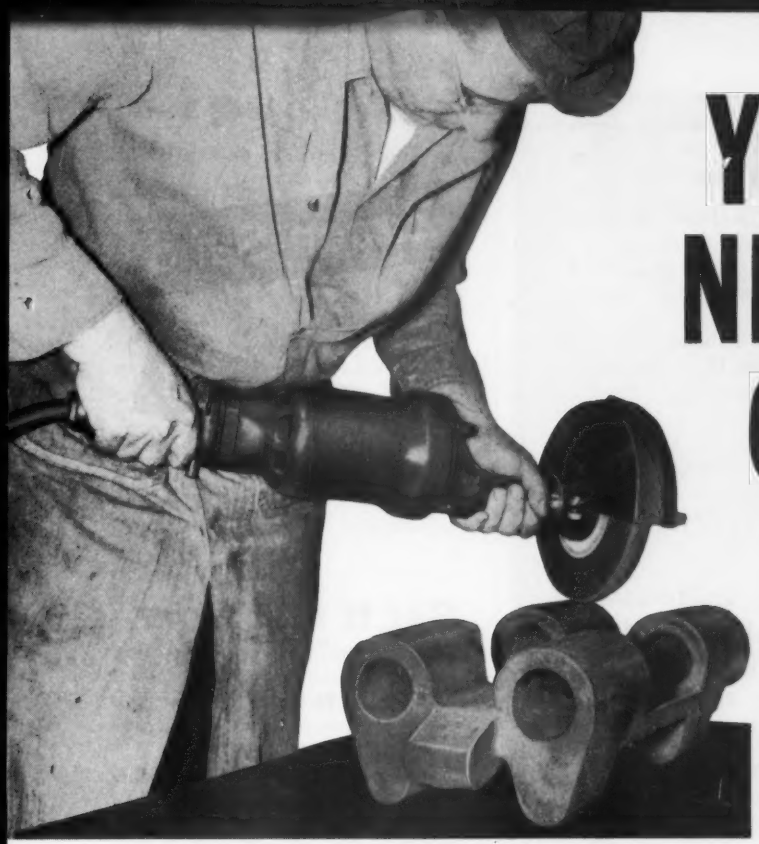
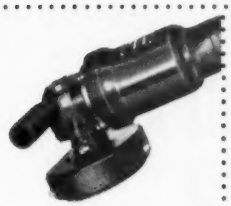


YOU NEED CP HICYCLE GRINDERS

If you do "heavy duty" production grinding



CP-550-SAG with stationary guard for rotary cup.

CP-550-SAG with revolving cup guard.

CP-550-SAS with angle sander.

CP-SAG with guard for 9" cut-off wheel or depressed center disc wheel.

CP-550-SAP with polisher.

And here are 8 reasons why...

1. **Hicycle motor** of advanced squirrel-cage design runs on 180 cycles, 220 volts, 3-phase current. No brushes to replace . . . No armature to burn out. 2. **Speed sag** is less than 15% under load, for maximum output. 3. **"Tri-Flo" cooling system** minimizes "hot spots". Keeps temperature rise at key points as much as 28° lower than with conventional type cooling. Prevents burnouts. 4. **Built-in overspeed protection.** 5. **Power/Weight Ratio** is outstanding because high strength magnesium castings are used for motor, gear case, and switch handle. 6. **Extra heavy micro-mesh gearing** heat-treated for long service. Oil-sealed ball bearings lubricated for life. 7. **Interchangeable motors,** motor housings, switch handles, and switches between all straight and angle models. 8. **Heavy duty switches** have dust-tight seals and phenolic spacers for insulation and to minimize vibration.

Heavy duty 6" and 8" Hicycle Grinders are available in straight and angle models. For complete information, write to: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

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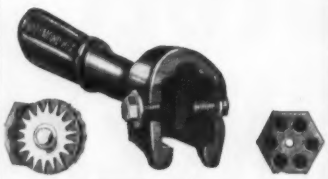
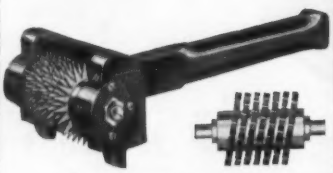


Desmond Hex Dresser

LIVES FOR FOUNDRY GRINDING WHEEL



Desmond Heavy Duty Dresser

DRESSERS

Cut grinding and snagging costs with inexpensive Desmond Hex dressers. They bring grinding wheel faces to "new" efficiency by removing loaded metal and exposing sharp abrasive grains. And Hex dressers provide six sets of bearings in one set of bearing blocks . . . for extra life on average wheels. For resinoid and rubber bonded high-speed wheels use the ball-bearing Desmond Heavy Duty Dresser. Ask your Desmond distributor's advice.

Desmond

Desmond-Stephan Mfg. Co.
Urbana, Ohio

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previously an assistant sales manager, and manager of the St. Louis and Washington offices.

Mrs. Katie Foley Branciere, 65, secretary and co-owner of Levee Street Foundry & Machine Works, Vicksburg, Miss., died May 3.

James C. Williams, 73, retired supervisor with U. S. Pipe & Foundry Co., Chattanooga, Tenn., died Apr. 24.

W. B. Goltra, 58, president, Goltra Foundries Inc., Barrington, Ill., died May 13.

Course on Quality Control To Be Held June 9-10

The University of Wisconsin, in cooperation with Wisconsin Chapter, American Foundrymen's Society, is sponsoring a course on quality control in the foundry June 9-10. All sessions will be held in Memorial Hall of the Milwaukee County War Memorial Center, 750 N. Lincoln Memorial Dr., Milwaukee, Wis.

Each person who completes the course satisfactorily will be awarded a certificate. Applications for enrollment and information should be made to Engineering Institutes, University Extension Div., 3030 Stadium, University of Wisconsin, Madison 6, Wis. Fee for the course and materials is $25.

Thursday, June 9

8:30 a.m.—**Registration:** Main Lobby.
9 a.m.—**Welcome:** Robert A. Ratner, director, Engineering Institutes, University Extension Div., University of Wisconsin.
9:15 a.m.—**Why Quality Control:** Lawrence S. Krueger, Pelton Steel Casting Co., Milwaukee.
10:20 a.m.—**Necessary Areas for Control — 1. Raw Materials and Melting:** F. W. Jacobs, Texas Foundries Inc., Lufkin, Texas.
11:20 a.m.—**2. Sand and Molding:** Richard B. Ballmann, General Malleable Corp., Waukesha, Wis.
12:20 p.m.—**Lunch**
1:30 p.m.—**3. Chemical and Physical Properties of Finished Castings:** Thomas D. Jennings, Schenectady Foundries, General Electric Co., Schenectady, N. Y.
2:50 p.m.—**Necessary Areas for Control Roundtable Discussion:** Moderator—James A. Arter, AMPCO Metal Inc., Milwaukee. Members—E. W. Jacobs, Richard B. Ballmann, Thomas D. Jennings.
6:30 p.m.—**Dinner Meeting—"Floundering in the Foundry":** Robert L. Loetscher, Engineering Dept., University of Wisconsin Extension Division.

Friday, June 10

9 a.m.—**How to Initiate a Quality Control Program:** W. P. Dudley, Ohio Steel Foundry Co., Lima, Ohio.
10:40 a.m.—**Nondestructive Testing for Quality Control:** Robert W. Larson, Larpen Industries, Milwaukee.
12 noon—**Lunch**
1 p.m.—**Physical Inspection—Statistical Quality Control Tells You How Much or How Little:** Ted Segodnia, Engine and Foundry Div., Ford Motor Co., Dearborn, Mich.
2:40 p.m.—**What the Customer Expects in Castings:** Thomas M. Logan, Purchasing General Office, Caterpillar Tractor Co., Peoria, Ill.
4. p.m.—**Presentation of Certificates**

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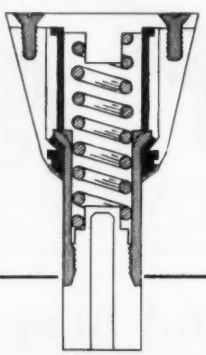


THIS IS THE TOOL THAT MAKES THE SPRUE!

Yes, this patented device forms a pouring basin and sprue at the same time the mold is jolted and squeezed. It eliminates a source of dirt in castings (from hand cut sprues) and insures a more uniform mold quality. The Meldau Sprue Former comes in sizes ¾", 1", 1¼", 1½", 2". Write today for more information about this most useful foundry tool.

MELDAU TOOL CO.
2524 S. 61ST AVE., CICERO 50, ILL.

Circle 707 on Page 53

Federal Metal Co. Completes Construction on New Plant

Federal Metal Co. will celebrate its 47th anniversary by moving from its original Morgan Avenue factory in Cleveland to a new plant on 9 acres of land in Oakwood Village, a Cleveland suburb.

The new 65,000-sq-ft plant is almost three times the size of the old one. Constructed of brick, concrete block, and corrugated asbestos, it features a roof with a 300-ft long monitor which provides exceptionally good light. Mercury lights throughout the plant provide almost the equivalent of daylight at night. The air-conditioned office wing features a striking masonry, brass, and enamel curtain wall and also houses the centrally located testing and inspection laboratory designed to facilitate a basic research and development program.

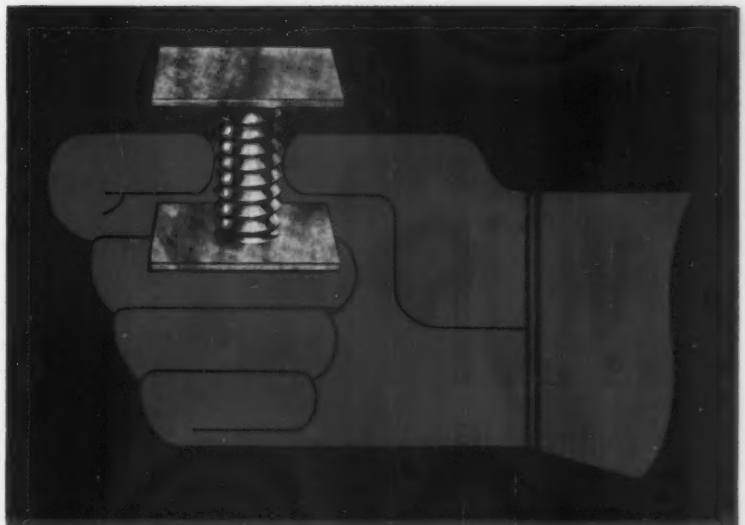
A dust and fume collector provides a constant change of air within the plant. At the same time, by a system of hoods and flues over the furnaces, all smoke is drawn from the operation into turbine-operated ducts which cool the gases and terminate in a 25 by 60-ft collector about 100 ft from the plant. All solid matter is filtered out.

Foundry Materials Handling Course Offered by MHEDA

A five-day course on foundry materials handling will be conducted June 13-17 by the Material Handling Equipment Distributors Association at its national training center, Newport, R. I.

Lecturers for the course will be Harry Kessler, Sorbo-Mat Process Engineers; Fred B. Henry, Jeffrey Mfg. Co.; Leslie Probst, National Engineering Co.; Michael R. Gallo, Taccone Corp.; William N. Ohlson, Draper Corp.; Albert Musschoot, Carrier Conveyor Corp., division of Chain Belt Co.; Robert P. Ferguson, Plainville Casting Co.; Frank Dzarman, Brown & Sharpe Mfg. Co.; A. T. Gaudreau, University of Pittsburgh; and Dr. Merton C. Flemings, Massachusetts Institute of Technology.

Contact the director, MHEDA National Training Center, P. O. Box 537, Newport, R. I., for further information.



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MILWAUKEE
CHAPLET
or CHILL
for every
CASTING JOB
to insure better castings
to reduce scrap losses
to reduce labor costs

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You get MORE with

MOROC®

the controlled silicate CO_2 binder

MORE SPEED. Curing time ranges from ten seconds to three minutes, depending on type of mold or core.

MORE LABOR SAVING. Cores are ready for use when they come from core box. You eliminate movement to and from ovens, handling of core driers, cementing of halves.

MORE FLEXIBILITY. Fast curing means faster handling of rush orders. There's no need to stockpile cores for future orders. You have the flexibility to meet customer needs on schedule.

MORE PROFIT. With MOROC you can get this extra capacity and flexibility with a smaller investment in equipment than would be required for additional ovens or shell-molding equipment.

MOROC COMES IN FOUR GRADES

MOROC 1. High-strength binder.

MOROC 2. High-strength and good collapsibility.

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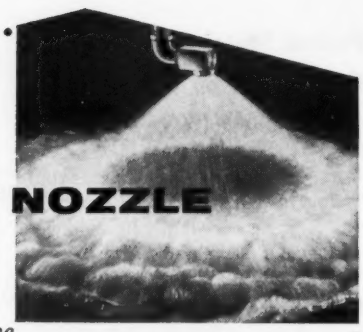
MOROC 4. Extra-high collapsibility and good flowability.

Other Diamond Chemicals for the foundry:
Soda Ash (briquettes & granulars) Caustic Soda, Chlorine, Solvents

Write for complete information. Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond® Chemicals



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SPRAY NOZZLE
problem?

perhaps one of our **DATA SHEETS** *can suggest a solution*

For almost every spraying application, there's a Spraying Systems Data Sheet that gives useful information on suggested installations and types of nozzles to use. If you have a problem, write and let us know the application involved . . . and we'll send the Data Sheet that applies.

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And . . . for complete spray nozzle information, write for Catalog 24.

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Euclid SERIES S
FEATURES
• Compact, Trouble-free.
• One-piece, heavy steel.
• Combination hoist frame and gear housing prevents misalignment or oil leakage.
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Chain racked trolley for economy when handling speed is not the key factor. (Easily converted to motor drive.)
Competitively priced, these hoists incorporate all the desirable features of design, operation and maintenance that have characterized Euclid products for more than 50 years.
"S" Hoists are also offered with lug and hook-on suspensions, plain trolley and motor propulsion units. Write for data.
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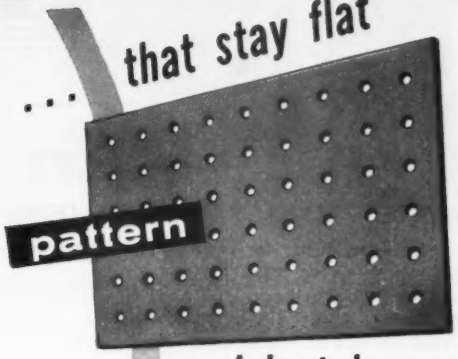
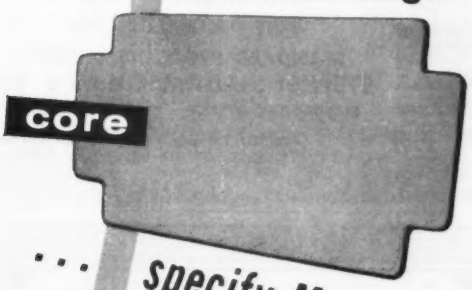
Circle 713 on Page 53

for plates

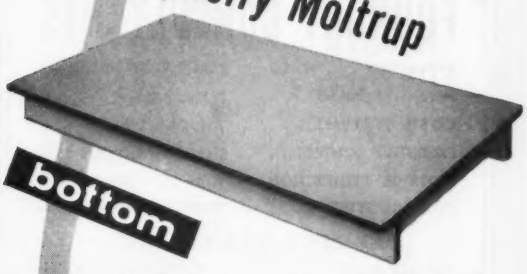
... that stay flat



... and last longer



... specify Moltrup



For accurate casting results specify Moltrup Plates. They are long-lasting and stay flat—because Moltrup employs a special flattening process designed to permanently eliminate buckling or bending. Consequently your investment goes further and your profit margin increases. Plates are made to your specifications. Write or phone us for complete information.

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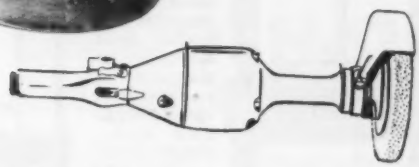
NON-FLUID OIL INCREASES AIR TOOL EFFICIENCY

Ordinary oil separates from water



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emulsifies with water

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Unlike ordinary oils and greases, "NR" Grades of NON-FLUID OIL absorb ever-present moisture in compressed air into the lubricant. Thus, despite air moisture content you are assured of perfect lubrication and complete protection against rusting, gumming or sticking.

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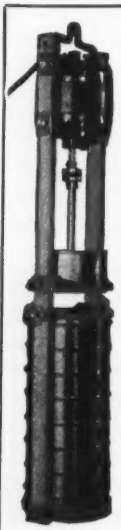
COMBS GYRATORY RIDDLES

"Greatest Name In Motion"

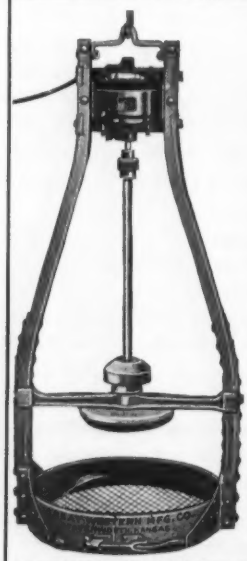
TYPE "CS". Complete price $395.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lbs, ½ H.P. enclosed motor.

TYPE "CR". Complete price $385.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., 1/3 H.P. enclosed motor.



TYPE "HL". Price $285.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.

PROMPT DELIVERY from your Foundry Supply House



TYPE "V". Price, 20" Sieve, $300.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. Height 4'6", weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $545.00.

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- Greater safety factor for personnel . . . no rope to snub with wire rope car puller.
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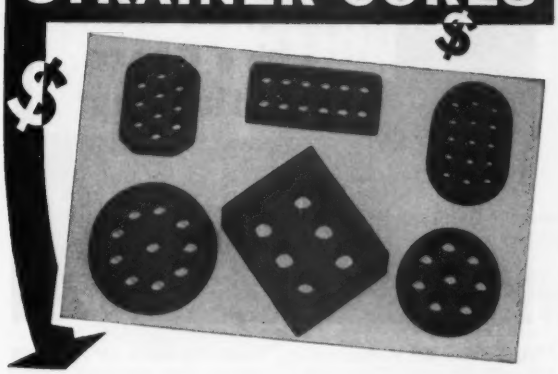
Save Money *with* RUDOW STRAINER CORES



Custom Made • Will Duplicate Your Sample or Drawing • Unlimited Design Range • High Heat Resistance • Extra Hard • Saves Time—Trouble

RUDOW quality Strainer Cores cut rejects, cut costs, keep castings free of oxides, slag and impurities—simplify gaiting control and metal flow, for greater production. We offer you Free Samples of RUDOW Strainer Cores—made like your sample, or from your drawing. Write today—or phone MAin 6-1163.

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Cuts wood, metal, plastics. One-piece frame makes it strong and durable, free from vibration at any speed. Table tilts 45 degrees to right, 5 degrees to left. Special guards make this the most completely safeguarded band saw on the market. Write for folder giving complete details.

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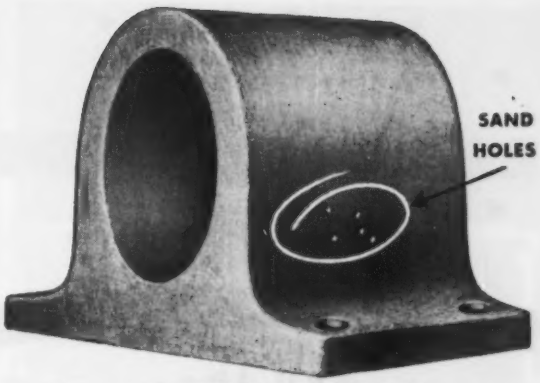

Save This Casting *with* SMOOTH-ON FOUNDRY CEMENTS

Often a perfectly good casting has blow or sand holes, surface blemishes, or rough and porous areas that detract from its appearance. But there's no reason why it can't *look* as good as it really is.

Simply use Smooth-On Foundry Cement. It goes on easily, quickly . . . hardens rapidly at a predictable rate . . . stays firmly in place.

SHADINGS TO MATCH ANY CASTING

4A • Medium Gray
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Quality Control That Assures You of Tight, Lasting Repairs

Every lot of Smooth-On Foundry Cement is laboratory tested for setting time, hardness and color. You can be sure of tight, lasting, good looking results every time, provided the directions are followed.

See how much better your castings will look after treatment with Smooth-On, known and used by leading foundries for more than 63 years. Try one or more of these cements at our expense. Write today—on your business letterhead—and we will send you free samples.

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SMOOTH-ON FOUNDRY CEMENTS

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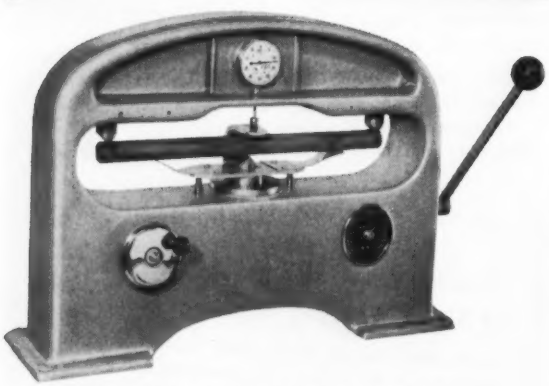
FOUNDRYMEN!!

NOW...A 4 MINUTE GRAY IRON TEST



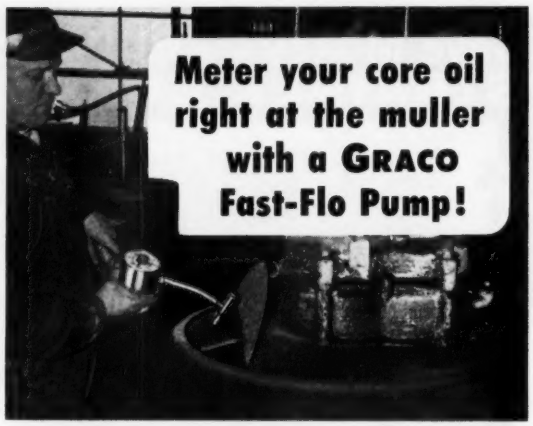
- Obtain accurate technical data on brittleness and strength as soon as test bar has cooled.
- Test data complies with Federal Specifications QQ-1-652.
- No experience necessary... no need to shield from factory dust.
- Tester is bench type, requires little space. Low in cost and trouble-free.

Send for folder
Write, wire or phone
for complete details

PASADENA HYDRAULICS INC.

PRESS **1433 Lidcombe, El Monte, California**

Circle 718 on Page 53



Graco Fast-Flo Pumps reduce handling costs. They transfer measured amounts of different fluids direct from original containers. Ideal for batching, applying or mixing . . . fluids are transferred quickly and safely. Aids good housekeeping; eliminates contamination.

Send for more information about this amazing *Graco* Fast-Flo that's suited both for large and small operations. It handles materials as thin as alcohol, as thick as cookie frostings! Fast-Flo Pumps are also available in stainless steel. Send for free idea booklet!

For nearest GRACO Supplier
SEE the telephone directory YELLOW PAGES
Look under "SPRAYING EQUIPMENT"

GRACO
ENGINEERS AND MANUFACTURERS
GRAY COMPANY, INC.
425 Graco Square
Minneapolis 13, Minnesota

Factory Branches
New York, N. Y.
Philadelphia, Penna.
Detroit, Michigan
Atlanta, Georgia
Chicago, Illinois
Houston, Texas
San Francisco, Cal.

Sales Office
Toronto

Circle 719 on Page 53

SPECIALLY SUITED TO PRODUCE FERROUS AND NON-FERROUS LONG TUBULAR CASTINGS

Castings up to 32 inches in diameter and 20 feet in length. These machines are ideal for jobbing foundry work as well as production.

Cast tubes of all alloys of non-ferrous metal as well as cast iron, alloy irons, steel, alloy steels and stainless steels.

Highly efficient type of water-cooling for permanent molds.

Trunnion machines built in many size ranges for specific requirements.

Illustrated Folder No. 160 Available on Request.

CENTRIFUGAL CASTING MACHINE CO.
P. O. BOX 947 TULSA 1, OKLAHOMA

Circle 720 on Page 53

WOLVERINE turntable DOWN DRAFT dust collecting benches

Type BT

PLUS — Superior dust collection due to higher down draft velocity (standard 300 feet per minute or, if application requires, velocities up to 800 feet per minute). Heavy duty industrial viscous filters in rear compartment remove dust from air stream and axial flow fan in top of compartment exhausts air vertically indoors or out, as required.
This makes the perfect system for collecting dust from grinding, polishing and sanding operations.

Save Operating Time, Improve Work

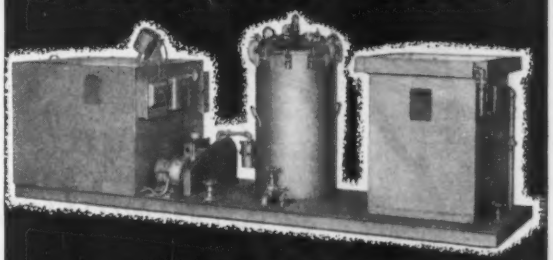
Revolving turntable permits continuous operation with no time lost in repositioning the casting.

WOLVERINE EQUIPMENT CO.
31 MAIN STREET, CAMBRIDGE 42, MASS.

Write for bulletin describing both the Turntable and Standard Wolverine Rectangular Dust Collecting Benches.
Dept. F

Circle 721 on Page 53

SAVE POROUS CASTINGS!



with MOGUL HIGH VACUUM IMPREGNATING

Turn old losses into everyday PROFITS! Permanently seal leakers and weepers in ferrous and non-ferrous pressure castings!

Complete packaged MOGULLIZING unit with extremely high vacuum (29" or more)

- hooks up to your utilities for immediate operation . . . saves costly installation
- removes ALL air and moisture from casting to be sealed . . . assures positive penetration of impregnant
- impregnates into most minute porosity by powerful vacuum action
- intensifies further penetration of impregnating material by use of air pressure
- use MOGUL CAST SEAL COLLOIDAL for the economical salvage of porous castings
- can also be used with polyester, vinylite, lacquer, wax, varnish, oil, styrene, phenolic resins

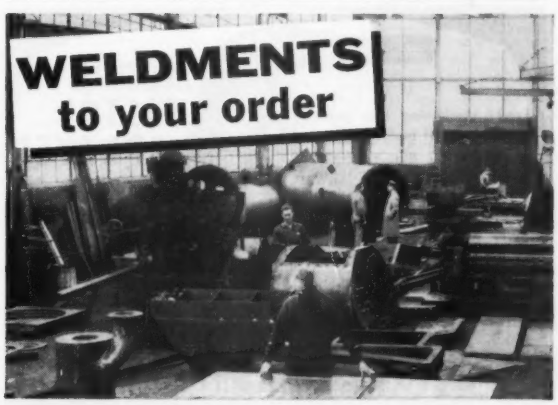
MOGUL®

Get the full details on the LOW-COST MONEY-MAKER METHOD OF SALVAGING REJECTS!
Write for illustrated BROCHURE now!
or PHONE SAcramento 2-3710

METALLIZING Company OF AMERICA, INC.
3520 W. Carroll Ave., Chicago 24, Illinois

Circle 723 on Page 53

WELDMENTS to your order



Complete facilities to produce all types of welded constructions . . . carbon or stainless steel and aluminum from 1/16" to 4" thick . . . to your specifications.

This includes tanks, chutes, hoppers, machine bases, stacks, breechings, angle rings, special cars, buckets, and other equipment.

Call or write for estimate. Let us show you how we can save you time and money.

PENN IRON WORKS, INC.
READING, PA. Phone FRanklin 6-4826

Circle 722 on Page 53

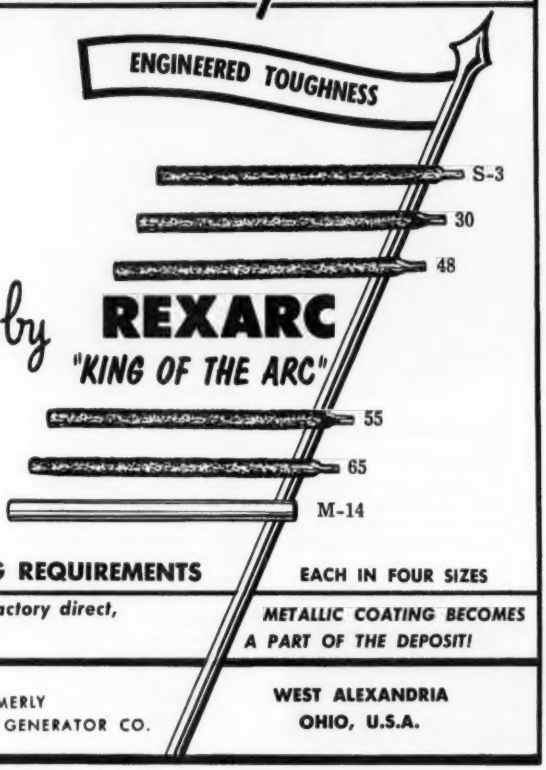
BETTER WELDS ★ SMOOTHER, EASIER APPLICATIONS ★ ADDITIONAL SAVINGS ★ BETTER WEAR RESISTANCE

A royal proclamation by REXARC "KING OF THE ARC"

presenting:

SIX ELECTRODES

TO COVER 95% OR MORE OF YOUR BUILDUP AND HARD-FACING REQUIREMENTS



EACH IN FOUR SIZES

Contact your nearest distributor, or the factory direct, for free 20-page manual

METALLIC COATING BECOMES A PART OF THE DEPOSIT!

MANUFACTURED BY Rexarc INCORPORATED FORMERLY THE SIGHT FEED GENERATOR CO.

WEST ALEXANDRIA OHIO, U.S.A.

Circle 724 on Page 53

RINGLIFT SAND CONDITIONER MAKES TIRED OLD SAND COME TO LIFE!

It is amazing how "beat" sand is made fluffy and alive again after a "beauty treatment" in the Ringlift machine. This easy-to-operate unit picks up all sand from floor. Screens, cools, aerates and tempers it. Magnetically separates metal, moistens sand and returns it to floor in neat windrows. Send for literature.

STATES ENGINEERING

245 E. Murray Street

Fort Wayne, Indiana

SAND PREPARATION • MECHANIZATION • PLANT LAYOUT

Circle 725 on Page 53

MURPHY PISTOL SPRAYER

Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.

Standard of the foundry field for over 50 years. Stocked by leading foundry supply houses. Guaranteed by . . .

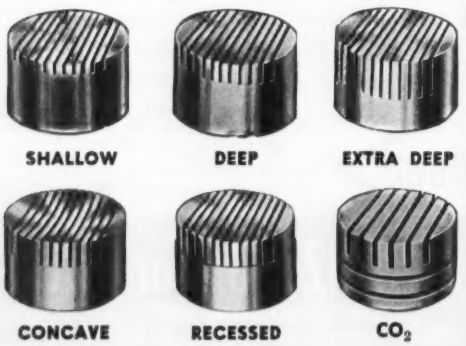
2673

JAMCO

JAS. A. MURPHY & CO., INC.

1425 EAST HIGH STREET, HAMILTON, OHIO

Circle 726 on Page 53



Slotted core box vents for every purpose. Inserting drill (right) ideal for inserting core vents. Special cleaning tool saves time.

C. M. SMILLIE & COMPANY

1124 WOODWARD HGTS.
FERNDALE 20, MICH.

Circle 727 on Page 53

CLASSIFIED ADVERTISING

• HELP WANTED

SUPERINTENDENT—NONFERROUS

To be responsible for shop departments, all personnel, foremen and equipment, melting through cleaning; able to produce high quality economical bench, machine and large floor work in high strength aluminum and bronze. Assisted by full laboratory facilities and X-ray inspection. Reply with resume and references.

FRONTIER BRONZE CORPORATION
NIAGARA FALLS, NEW YORK

METALLURGIST

Graduate engineer with experience in sand core and mold work. Technical service and sales duties on latest techniques for accelerated sand hardening. Growth opportunity in sales department. Submit resume and salary requirements. Cardox Division, Chemetron Corporation, 840 North Michigan Avenue, Chicago 11, Illinois.

FOUNDRY SUPERINTENDENT
NONFERROUS

Excellent opportunity for man with both experience and technical knowledge as Superintendent of one of the Chicago areas' oldest and largest nonferrous foundries. Must be capable of producing general jobbing line of aluminum, brass and bronze, including pressure tight castings. Please send detailed resume stating salary requirements. Address: Box 390, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT WANTED

For a small capacity Electric Steel Foundry. This is a foreign assignment for a three year engagement. Living conditions are good. Salary $18,000 per year, first class passage and 3 months terminal leave with pay on completion of engagement. Superintendent must be a competent Steel Metallurgist and experienced Electric Furnace Operator. In reply please give full outline of past experience, age, whether married or single. Address: Overseas Industrial Services, 681 Market Street, San Francisco, California.

METALLURGIST

B.S. Degree. A recent graduate or a man with several years experience. We produce gray iron and ductile. Please provide complete background in first letter including references and salary desired. Colorado location. Address: Box 372, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SENIOR INDUSTRIAL ENGINEER

With executive ability to administer and add refinements to incentive wage program for large Milwaukee steel foundry. Foundry experience essential. Salary commensurate with qualifications. Please send resume. Address: Box 365, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED
Aluminum Permanent Mold
Foundry Foreman
in
Northeastern Area
Salary Open

Box 373, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WORKS MANAGER

For ferrous and nonferrous jobbing and production foundry. Sand and shell molding and coring. Presently 400 employees. In addition to foundry know how must have finishing, machining and manufacturing experience. Foundry one of the oldest and best established in the midwest. Capacity presently being increased through building program and major equipment installations. Please send detailed resume including salary requirement. Address: Box 377, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

To manage all operations of a medium size, captive gray iron foundry. Applicant must have a sound background in foundry practices and be capable, aggressive organizer and administrator. Age 32-45. Liberal salary and benefits. There are excellent opportunities for further growth and promotion with this progressive company, for the right man. Applicants to send in personal history, including employers, positions held and salary. All information will be treated as confidential. Address: Box 380, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CORE ROOM SUPERVISOR

Jobbing and production foundry located in Northern Illinois. Ferrous, nonferrous, sand and shell. Please mail complete resume. Address: Box 378, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• HELP WANTED

METALLURGIST

Broad supervisory responsibilities in Western New York gray iron foundry, including metallurgy, sand control, raw materials and other foundry services. B.S. degree with minimum of 3 to 5 years' foundry experience required. Good starting salary and opportunity for advancement.

BOX 384, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY MANAGER

Immediate opening for a man capable of taking complete charge of jobbing foundry located in the Middle West producing gray iron, ductile iron and alloy castings with a capacity of over $1,500,000 per year. Metallurgy is essential plus the ability to handle men, cost and quality control experience and the ability to establish a workable production control program. Prefer college graduate or equivalent between 40 and 45 years of age. Salary commensurate with qualifications. Submit complete resume of experience, education and salary expected to

BOX 387, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

MANAGER'S ASSISTANT

For cast iron plumbing fixture plant, needs rounded out knowledge to back up manager. Address: Box 401, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DRY SAND FOREMAN

Qualified and progressive foreman desired in HEAVY DRY SAND MOULDING DEPT. Producing castings up to 30 tons. Well established high strength iron foundry in northern Ohio. Address: Box 375, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FLOOR MOLDING FOREMAN

Wanted by long-established foundry in Southwestern Ohio. Must have supervisory experience and be thoroughly familiar with stainless steel casting. Position offers top wages and excellent working conditions to right person. Pension, many fringe benefits, including excellent insurance program. Send complete resume. Address: Box 382, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CHIEF MELTER

Experienced electric arc furnace. Acid practice—carbon, low alloy and stainless steels—full charge of furnace and ladle practice. Induction furnace experience helpful. Salary open. West Coast location. All answers strictly confidential. Address: Box 404, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY METALLURGICAL ENGINEER

Wanted for nonferrous foundry. Must have experience on problems of gating, risering, pouring, sands and cores. B. S. Degree in Engineering required. Must have minimum of five years' experience. Age 28-50. Excellent opportunity for capable and energetic man. Salary open. Please reply stating your personal data, qualifications, experience, salary expected and availability in first letter. All inquiries will be held in strict confidence. Direct all correspondence to: Ampco Metal, Inc., Personnel Department, Box 2004, Milwaukee 1, Wisconsin.

• POSITIONS WANTED

PACIFIC NORTH WEST FOUNDRIES

Does your top management team need a resourceful and intelligent individual with imagination, productivity and integrity plus a diversified gray iron foundry experience? Engineer graduate with added business education. Journeyman. Middle thirties.

BOX 368, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

• POSITIONS WANTED

FOUNDRY TROUBLE-SHOOTER

Former foreman and superintendent. Thoroughly experienced and expert on sands, facings and gating. Qualified for spot trouble-shooting with gray iron and alloys experience. Desire part time employment. Address: Box 374, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Ferrous and/or nonferrous, 39 years of age with 13 years of extensive foundry experience. Qualified to handle all phases of foundry operations. Detailed resume on request. Address: Box 385, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Practical foundryman, nationally known for a job well done. Age 48. Good health. Now employed. Looking for more action ferrous or nonferrous, $15,000 minimum. Address: Box 364, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

PRESENTLY EMPLOYED AS SALES MANAGER BY LEADING AIRCRAFT STEEL FOUNDRY. PREVIOUSLY ASSISTANT SALES MANAGER FOR 200 TON A DAY GRAY IRON-NODULAR IRON PRODUCTION SHOP. DESIRES POSITION AS SALES MANAGER FOR AGGRESSIVE GROWTH COMPANY. EXCELLENT BACKGROUND AS APPRENTICE, ASSISTANT SUPERINTENDENT, CHIEF METALLURGIST, MARKET ANALYST, CONTRACT PROPOSAL, ADVERTISING AND SALES MANAGER. AGE, 43. MARRIED. SALARY $15,600. ADDRESS: BOX 389, FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

FOUNDRYMAN

20 years' experience, 9 years' sales and service. Supervisory experience latest automatic molding units and all phases of foundry operation. Know cupola, air furnace, sand control and rigging. Sales or superintendent position desired in gray iron or malleable foundry. Presently employed as Assistant Superintendent. Address: Box 367, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

Over 20 years' practical and technical knowledge of all phases, including inspection and shipping. Gray iron and steel. Large and small castings. Seeking challenging and permanent position with progressive company. Address: Box 383, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Nine years experience in all phases of foundry operations. Seeking challenging position with future. B.S. degree in Metallurgical Engineering. Address: Box 386, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Thirty-four years' experience, ferrous and nonferrous, practical and technical, twenty years' supervisor. Prefer small shop. Now employed. Age 55. Address: Box 403, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER-SUPERINTENDENT

Graduate foundryman experienced in all phases of gray iron mechanized foundry operations, up-to-date on latest developments and methods, cost and quality minded, now employed, desires relocation including overseas assignment. Address: Box 395, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

20 years' general gray iron experience. Basic and acid cupola and metal control, casting and sand control. Age 49. Address: Box 396, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL OR WORKS MANAGER

Age 44, Mechanical Engineer, 25 years' experience in all phases of ferrous foundry operations including machine shop and equipment erection. Thorough knowledge of labor relations and negotiating procedures, sales and accounting methods. Presently employed seeking a more progressive company. Address: Box 402, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT—MANAGER

Metallurgist and foundryman looking for growing, progressive foundry to which he can devote energy and ambition in exchange for lucrative future. Experience includes management, research, quality control, plus early trades training. Address: Box 394, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TECHNICAL SALES REPRESENTATIVE

Experienced technical sales representative desires Michigan, Ohio, Indiana Territory. Practical and technically trained supervisor in iron and steel. Send replies to: Box 405, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• ENGINEERING SERVICE

SPECIAL SERVICE . . .

You may have a PROBLEM which you have been UNABLE TO RESOLVE with your own organization personnel. A problem that could be QUICKLY SOLVED in a month . . . a week . . . a day . . . BY A WELL-QUALIFIED MAN of experience. We have a man or men with many years of experience in the exact areas with which you are concerned. Representative areas include plant layout, modernization, operation, selection and installation of equipment, technical processes, metallurgy, personnel development, methods, etc. To help you, we assign individuals who have 40 or more years of actual experience in specialized fields . . . invaluable know-how, yours to command for as long as you need it. WRITE OR PHONE for detailed information.

WESTOVER SPECIAL SERVICE ASSOCIATES
3110 W. Fond du Lac Ave., Milwaukee 10, Wisconsin, Phone Custer 3-2121

• EMPLOYMENT SERVICE

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. FINANCIAL 6-8700
JOHN COPE, DIRECTOR, 29 E. MADISON ST., CHICAGO 2, ILL.

JR. FOUNDRY METALLURGIST
$7,200 TO $8,400

Promotable type young man to join rapidly expanding organization that places a great deal of emphasis on engineering proficiency. Client pays fee. Contact Bill Newell in confidence.

MONARCH PERSONNEL
28 EAST JACKSON BLVD.
CHICAGO 4, ILLINOIS

FOUNDRY SUPERINTENDENT
$12,000 TO $14,000

A once in a lifetime opportunity to associate with modern foundry. Will consider top assistant. Client assumes all expenses. Contact Bill Newell in confidence.

MONARCH PERSONNEL
28 EAST JACKSON BLVD.
CHICAGO 4, ILLINOIS

• ACCOUNTS WANTED

REPRESENTATION AVAILABLE

Practical and Technical foundryman with thirty years' experience at top-management level wishes to establish a complete casting sales and service clientel in the Midwest area. Thoroughly familiar with all phases ferrous and nonferrous metals. Illinois, Iowa, Indiana, Michigan and Wisconsin Territory. Have nonferrous and iron purchase accounts.

P. O. BOX 305
DECATUR, ILLINOIS

EASTERN MANUFACTURERS REPRESENTATIVES AVAILABLE

Long established, good following among O.E.M. and other accounts. Headquarters New York, now handling only Aluminum Sand and Permanent Mold castings, desires non-conflicting foundry lines, exclusive basis. Give full details in first letter.

BOX 388, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ATTENTION
GRAY IRON FOUNDRIES

Wonderful opportunity for you to expand your sales by furnishing gray iron castings (Loaders, Weights) for lamp and lighting fixture industry. Tremendous following and wholesale contacts. Large Eastern distribution.

FOR FURTHER INFORMATION WRITE:

BOX 904
1501 BROADWAY NEW YORK 36, NEW YORK

ESTABLISHED MANUFACTURERS REPRESENTATIVE

Now handling gray iron castings urgently needs quality steel and alloy foundry to serve existing accounts in Ohio, Indiana, Kentucky. Address: P. O. Box 961, Cincinnati 1, Ohio.

• CONSULTANTS

FOUNDRY CONSULTANT—NONFERROUS

Sand casting—permanent mold casting—centrifugal castings—in aluminum, brasses, bronzes, 30% leaded bronze—aircraft quality bearings and castings. Address: ED JENKINS, West Palm Beach, Florida. PHONE: TEMPLE 2-8685.

• REPRESENTATIVES WANTED

COPPER BASE ALLOY SALESMAN

Large Midwest manufacturer of copper base alloys in all forms is expanding its outside sales staff. Technical experience and education are desirable but not necessary. Selling experience in metals field highly desirable. Compensation is salary plus commission. All travel expenses paid. State experience, education and income requirements in first letter. All replies held confidential. Address Box 381, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVE

Gray iron foundry with excellent jobbing and semi-production facilities interested in obtaining a sales representative familiar with Chicago area. Write Box No. 397, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• OPPORTUNITY

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

• WANTED-TO-BUY

WANTED

1000 # — 2000 # capacity Reverberatory Furnace for Iron

Centrifugal Casting Machine to cast up to 10" O.D. x 30" Lg.

BOX 399, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SHELL MOLD MACHINES

To handle 14" x 18" and 15" x 20" Molds. Address: Box 366, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

5 to 6 Ton crane. A.C. Current. 220 Volt. 3 Phase. Floor operated. Not over 25 ft. span. Address: P.O. Box 531, Tiffin, Ohio.

WANTED

Used Universal Sand Strength Machine. Late model. Address: Box 376, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MIXER WANTED

Used Simpson Intensive Sand Mixers, State size, condition and lowest cash price for immediate acceptance. Address: Box 369, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Used or Broken Silicon Carbide Grinding Wheels of any kind or size, regardless of bond. Will pay $35.00 per ton. Union Mining Co., 1st Nat'l. Bank Bldg., Pittsburgh 22, Pa.

• FOUNDRIES FOR SALE

GRAY IRON FOUNDRY FOR SALE
APPROXIMATELY 15,000 SQ. FEET

Located in Illinois with excellent rail and truck facilities. Now operating. Pouring 10-15 tons per day. Could pour 20-25 tons. Airless blast, B-P #50 speedmuller, annealing oven, overhead pouring systems, modern core room with 3 core blowers and oil fired ovens.

Complete maintenance room 36" Cupola with skip hoist. Miscellaneous castings produced from 1 oz. to 50 lbs. Small Aluminum shop—200 lb Fisher Furnace, gas fired.

Sales 1959 over $400,000. Good profit potential. Good help available, including skilled, unskilled and supervision. Owners salaries can pay for this shop in 7 years. Terms can be arranged. Present owners retiring.

BOX 370, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOR SALE

Fully equipped now operating gray iron foundry in western New York State for sale. Located near the New York Power Development. Reason for selling, present owners want to retire.

BOX 392, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOR SALE

Health reasons force me to sell controlling interest in a magnesium and aluminum foundry with excellent sales potential. Equipped with gas and oil furnaces, permanent molds, four squeezer stations, masonry building 4500 sq. ft. floor space. Located in Michigan near cities where Magnesium and Aluminum castings are in growing demand. Address: Box 391, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

• FOR SALE

DEMONSTRATOR FOR SALE
STANDARD 48" VERTICAL TYPE CORE GRINDING MACHINE

with individual dust arresting system . . . . 48" diameter poser driven rotary table and direct motor drive to grinding wheel through flexible coupling from the motor to ball bearing mounted spindle in separate housing bolted to sliding head on upright column.

ORIGINAL SELLING PRICE $8150.00

Will sell subject to prior sale for $4000.00. Literature available.

MACHINE PRODUCTS CORPORATION
6771 E. McNICHOLS ROAD
DETROIT 12, MICHIGAN

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to carry a complete line of "Hard Chrome Rebuilt Tools" at about half the cost of new tools. Before you discard your old tools, why not send them to us for our estimate on the cost of renewing them with our Hard Chrome Process?

CENTRAL PNEUMATIC SERVICE, INC.
512 LINDEN AVENUE
DAYTON 3, OHIO
PHONE: CL 2-2701

FOR SALE

SIMPSON—#1 Muller w/Aerator and Loadex—good

Double-End-Grinders—5 H.P. Pedostal, 16 x 2 x 1½ wheels, 2 Available . . . good buys

MOULDERS' FRIENDS—50" w/Extra Bruch, 2 Available

OSBORN—#559 Jolt Pin Lift . . . never used

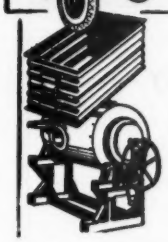
BEARDSLEY AND PIPER — Preparator #60, Complete, 2 Available

For this and other good equipment contact

W. O. McMAHON
P. O. BOX 3799 HOMEWOOD STATION
BIRMINGHAM 9, ALABAMA
PHONES: TREMONT 1-2088 AND 9-6170

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO



WHEELABRATORS
3—6 cu. ft. Continuous Tumblast
1—42" x 48", 17½ cu. ft. Tumblast with loader
1—27" x 36", 5 cu. ft. Tumblast
1—6' Table Airblast w/six aux. tables
2—6' Table Pangborn LF and LE

MULLERS
Simpsons # 1, 1½, 2, 3, unit drive
Clearfield #404, 610
Beardsley-Piper #40

LADLES-WHITING
4—25 Tons
2—15 Tons
2—10 Tons

CORE OVEN
1—Di-Electric Model M800-A Thermonic, 30 KW

SANDSLINGERS
1—B-P 22" head stationary, R&L arm
1—B-P 19" head stationary, double belt
1—B-P 19" stationary, riddle type

WANTED!
COMPLETE FOUNDRIES,
SMALL/LARGE.
PROMPT SERVICE.

— **GLENVILLE 1-1222**

Circle 866 on Page 53

FOR SALE

SURPLUS FOUNDRY EQUIPMENT AVAILABLE FROM A RECENT ACQUISITION

MULLERS
#3F Simpson—Type UD W/Loader, 1951
#1H Simpson—Type UD W/Loader, 1951
#50-A-B/P W/Loader—1957
#3½, Mulbaro B/P (3 extra barrowa)

AERATOR & SHAKEOUTS
National Eng.—C-X10-C4, 1952
Royer Portable—16" Belt 2 HP
Hewitt Robins "Floatex" Portable
Cap.—17 ton—72" x 120" Style JF-11

COMPLETE SAND SYSTEM
Belt Conveyors (5)
Dings Magnetic Unit
50 Ton Storage Hopper
2—25 Ton Distribution Hoppers

SAND SLINGER
Beardsley-Piper Motive Type 4" Tip 2 Speed 19" Head 1952 yr. Complete w/mag. sep. Rectifier & Elevator, 200 cu. ft. Hopper, and 300 ft. of track

CUPOLA & COMPRESSOR
1 Whiting #9
1 Byrant Mfg. #7
1 Spencer Compressor (Cupola Blower) 9000 C.F.M.—32 oz. Pressure, 125 H.P. T.E. Mtr. 220/440 (like new), 1958
ROOTS BLOWER, size 7, rotary pressure, type 100 H.P., T.E. 220V. 705 RPM, 1956
FOXBOROs, air wt. controller, model 40, reading X-900—CFM and pressure, ten X-1-oz. per sq. inch, 0-32 oz., (like new, 1958)
FOXBORO, model 10 (Stabilag flow controller)
FOXBORO, model 10

CORE OVENS
Foundry Equipment Co. car Type 18' w x 20' lg. 18' high (2 cov)
Fuel: Gas and oil—BTU 4,000,000 per hr.
Hauck Burner—complete w/Clarage fans and Browning and Honeywell Controls
Young Brothers 3 Section—oil fired (2 burners)
Drawer and Tray type 48" x 18" x 70"
Foundry Equipment Co. Fuel—gas and oil, BTU 1,700,000 Per Hr.
Burner—Hauck, Fans Clarage, Compressor; Rack Type Unit 20' w., 20' l., 12' h.

MOLD DRYERS
Foundry Equipment Co., Fuel—oil, Burner—Hauck, BTU—750,000 per hr., Fan—Clarage, Complete Temp. Controls

MOLDING MACHINES
International Plain Jolt—8500 lbs. cap. Type J 72" x 72" Table 16" Cyl., 1952
International 1500 lbs. Cap. Type AN Draw & R.O. 30" x 16" Table Air Clamp, 1952
International Type JJR, 1952
International Type PVJS 12" cyl., 1951
International Type JDP 10" Draw Cap. 1200 lbs., 1952
International Type L 20" Draw 15000 lbs. Cap. Flask—48" sq. or 90" I.D., 1952

SAND BLAST AND GRIT ROOM
Pangborn—Double Door
14' w. x 18'l. x 10' h. Bucket Elevator 26' centers
Type AU-11 Tank Direct Pressure
Type B.U.R.—Abrasive Separator
Pangborn Dust Collector
Type CK Size #215
(3) Misc. Dust Collectors

FOUNDRY LABORATORY
MFG. Tinius Olsen Testing Co.
Universal Testing Machine, 1951
Cap. 120,000 Lbs.
Range 0-120,000 lbs.-200
0-20,000 lbs.-50
Specimen—Up to 24" Plus Stroke
3" x 1": Flat Stock 1¾" Round
Test 18" in compression and has a clearance of 15"
Test Speed 0" to 2" per minute
Travel on arm 6"

OTHER EQUIPMENT:
Moisture Teller, Foundation Tester, Sand Rammers, Permeability Meter, Universal Strength Machine, Sinter Meter, Thermolab Dilatometer, Deformation Recorder, Hot Gas Vol. Determinator, Hot Permeability Oxygen Regulator, Speedy Moisture Teller, Bochit Bench, Electric Oven, Brinell Hardness (2500 KG) Ainsworth Balance Scale, Bausch & Lomb Optical Microscope, Nickle Optical Determinator, Stand Microscope, Meter for Thermocouples, Lindberg Furnace, Carbon Determinator, Hevi-Duty Electric Multiple Unit Furnace, Combs Laboratory Sifter, 1 set of Sand Testing Sieves, Bomstead Water Still, Fisher Unitized Laboratory Furnace, Chemical and Pyrex Laboratory Ware.

MISCELLANEOUS EQUIPMENT
Hoppers, Chain Slings (100), Welders, Clam Shell Buckets, Scales, Pneumatic Floor Rammers, Chipping Hammers, Lockers, Transite Core Plates, Yale Hydraulic Lift Trucks, Core Racks, Mold Heaters, Core Rod Straightener, Rod Cutter, Disc. Cutoff Saw, Chain Falls, Hauck Tanks and Hoses, Budgit Hoist, Trolleys, Coke Wheelbarrows, Vises, Anvil, Time Clocks, Bondactor model 1000L w/903 gun (1954) . . . 6 Jib Cranes . . . 6 Misc. Bridge Cranes . . . 10 Industrial, Whiting, and Modern Ladies . . . 2 Niles 35 Ton Crane . . . 3 Niles-Bement-Pond Crane 21' Traveling Crane . . . 12 Shepard 3 ton Hoist D.C. . . . 500 Ton Misc. Flask, and Bottom Boards.

INSPECTION BY APPOINTMENT *ONLY*

EQUIPMENT NOT AT CHICAGO LOCATION • MAIL INQUIRES INVITED

AUTOMATIC CLEANING AND EQUIPMENT COMPANY

927 SOUTH CICERO AVE. • CHICAGO 44, ILL. • PHONE: ES-8-5647-8 • J. STRACKE

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FOUNDRY ENGINEERING SERVICE

FOUNDRY EQUIPMENT BY FOUNDRYMEN

HAMLIN-NAGEL, INCORPORATED

Box 192, EDWARDSVILLE, ILLINOIS, *In Metropolitan St. Louis*, PHONE 3864

B & P Motive Jr. Sandslinger complete with all accessories, tanks and rail, LATE!

Large Capacity Plain Stripper for Sandslinger.

International AN Rollover Stripper, JDP Jolt Stripper, JRR Double Jolt Machine.

Complete 12 to 20 Station Sand System.

Modern Cupola Swivel Charger.

Three Complete Chemical & Physical Laboratories

Large Capacity Plain Jolters.

Air Blasting Rooms, complete or component parts.

AIR COMPRESSORS

10, 15, 25, 40, and 50 HP water cooled
175 hp synchronous, 2 stage IR-XRE

AIRLESS BLAST EQUIPMENT

Wheelabrator 48 x 72 with skip and dust collector, excellent condition.
American 66" Swing Table 48 x 48 with Skip Hoist

Wheelabrator 27 x 36 with skip
Wheelabrator 42 x 48 with skip & collector
Wheelabrator 36 x 42 with skip & collector
Pangborn #3 continuous with feeder & collector
Pangborn 3LF Plain Table

CORE BLOWERS

Demmler 103EO, skip feeder & automatic cycle
Demmler 3EO, feeder & semi-automatic cycle

Demmler #1 and 2, #55 and 2K
Champion CB-8 and CB-15 and CB-18
Redford #1 & 2
San Bio CB-40-D-LPP

CORE OVENS

Coleman 39' tower combination Oil and Gas
Foundry Equipment Portable Mold Drying Oven
Large Foundry Equipment Mold Drying Oven
Large Porbeck Mold Drying Oven
Porbeck double end Gas or Oil

JOLT PIN LIFT

Davenport 34A
International JDP, 1200# capacity
Milwaukee 1536

JOLT SQUEEZE PIN LIFT

International PKL14
International PK20
Milwaukee 125, 126, 145, 195
Osborn 712PJ

JOLT ROLLOVER DRAW

Herman 40 x 60—10,000#
International F
International G 30 x 12
Johnson & Jennings 918
SPO 508
Tabor 30 x 50

JOLT SQUEEZE ROLLOVER DRAW

Osborn 332
SPO 920
SPO 413D

JOLT SQUEEZERS

International PJS-16"
International LJS-10"
International LJS-12"
Milwaukee 103
Osborn 275J
SPO 110J
Tabor Top Squeezers

MATERIAL HANDLING

Hough HA Payloaders, Forklifts 4000#, 6000#, 7000#, Handling Boxes.
Roura Hoppers.

½ Yard Clamshell Buckets
1 Yard Clamshell Bucket
Hoists Air and Electric
Hough HA Payloaders & Forklift Trucks
Champion CB-8 and CB-15 and CB-18
Crane Magnets 50", 55"

METAL HANDLING

Ladles 250#—25,000#
Pouring Devices, various capacities
Motorized Ladle Carrier
12" Cleveland Tramrail

MULLERS

Simpson #3UD complete with skip, auto-cycle, cooling hood, etc.
Simpson #2UD with skip
Simpson #1UD, skip, hood, auto-cycle, etc.
Simpson #3 open gear with skip
Simpson #2 open gear with skip
B&P #60—W or W/O multromatic
B&P #50A with skip, Multiroll, hood, etc.
B&P Mulboro

SAND CONDITIONING AND HANDLING

Screenarator S, M, L.
Royer NDP
American Sand Cutters—various sizes.
Bucket Elevators
Troughing Conveyor 16" x 34' w or w/o magnetic pulley.
Oscillating Conveyor 24" x 30'—year 1956
B & P No. 40 and 60 Preparators

MISCELLANEOUS EQUIPMENT

Foxboro Air Weight Controllers
Grinders, 18" x 24"
Detroit Hardness Testers
Flasks, Steel, various sizes
Flasks, Aluminum Slip
Flasks, Fremont Magnesium Slip
Jackets, Aluminum & Wopper Jaw
Core Plates—Aluminum & Transite
Cupola Blowers—15 HP Spencer, 100 HP R.C.—125 HP Spencer
Cupolas 2½, 4, 5, 6, 7, 8, 9 and 10
American Core Rod Straightener
Swing Grinders
15 HP Swing Grinder and Tumbling Barrels, 48" x 72"

42" Bullard "New Era" VTL lathe with side head
52" Betts Boring Mill with two loading arms.

WANTED! GOOD SURPLUS EQUIPMENT . . . . . .

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

EXCEPTIONALLY POPULAR ITEMS AT REALISTIC PRICES

SAND MULLERS

2—BEARDSLEY & PIPER Speedmullors, Model 80. Cap.—24 cu. ft. Pan diameter 8'-6". W/air operated batch hopper, water meter, dust hood, 15 HP Clarage cooling fan, Multramatic control, 125 HP Motor. Serial #80-61 & 80-60.
4—SIMPSON Sand Mullers, Model 3½-UD. Pan diameter 9'-3", crib depth 42", Unit Drive. Muller wheels 5500# weight, 45" diameter, 13" face. Capacity 45 to 50 cu. ft., 75-ton per hour. With 75 HP.

3—B & P No. 80 Speed Muller—24 cu. ft. air cooled.
1—B&P #30 Speedmullor, 4 cu. ft., w/skip Hoist Loader—Air Cooled.
1—B&P #60 Speedmullor, 12 cu. ft., w/skip Hoist Loader—Air Cooled.
1—B & P #70 Speedmullor, 18 cu. ft. w/loader.
1—BESSER Paddle Type, 30 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders, 10 to 14 cu. ft. batch.
1—CLEARFIELD #404, 4 cu. ft. batch.
1—DRAVO-DOYLE 6 cu. ft. cap, Port.
1—LINK-BELT 48" x 8' Paddle Type.
2—MASTER 300# Shell Type 5' pan dia.
1—SIMPSON #1-H Style UD, 400# batch.
2—SIMPSON #1½ style UD, 700# w/loader.
2—SIMPSON #2, Style C, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu ft paddle type.
1—LANCASTER No. EDG-4, 5 cu. ft.
1—LANCASTER #EA-4, 6 cu. ft. w/loader.

AIR & ELECTRIC HOISTS

85—I & R Air Motor type, sizes A, B, C, D, D-6 & E. ¼, 1, 2, 3 & 5 ton.
15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
1—DETROIT Model LHR, 5 ton, elec.
20—THOR air hoists, ½, 1 & 2 ton cap.

BUCKET ELEVATORS

12—LINK-BELT & JEFFREY, 30, 40, 50, 60 ft. cc. 10 x 7, 12 x 7, 14 x 7, 16 x 8 buckets.

CUT-OFF MACHINES

1—TABOR C10AF, 16" wheel, 10 HP.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER #50 Model 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4 & 4E. 10 to 100 lb.
1—FEDERAL 40P-1 San-Blo.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. Cores.
2—REDFORD #2—Magazine type.
1—SAN-BLO Model CB-40-B, 40# Cores.
1—SPO Model SC-10-DM, hollow core.

CORE OVENS

1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—DESPATCH Type "8" 6' w x 16½' l x 7¼' h Oil Fired.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.

CUPOLAS, BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—CUPOLA Bondactor, style 1205-L.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W. Sizes No. 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

4—DETROIT LFA. 350# Cold Charge 700# Molten w/200 KVA transformers.
1—TOCCO 20 KW Induction, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
6—AJAX 35 KW Induction 460 V 1 phase.
1—DETROIT Size CM—4000# Charge, 8000# Molten, w/1000 KVA trans.
2—AJAX 20 KW Hi Frequency Converters.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilt. Sizes 150, 400, 600, 1000, 1700, 2000 & 2400#, alum. cap. Gas or Oil.
29—LINDBERG & HAUSFELD Stationary, Sizes 100, 150, 200 & 550 cap.
1—SKLEENAR 1200# Rev., hand tilt.
1—MONARCH 600# Rev., hand tilt.
1—STROMAN, "U" 600# Reverb.
1—STROMAN DC "Dipout" 800# cap.
1—ECLIPSE E1000—Double Chamber Dry Hearth 1000# cap.

GRINDERS

Swing Frame

1—FOX #4 Wheel 24" x 3"—20 HP.
1—MARSCHKE 20" x 10" wheel, 10 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24".

Snagging

4—FOX #7—30" x 3" Wheel, 15 HP.
2—U. S. #64, 20" x 3", 7½ HP, 4 speed.
2—SAFETY #174, 24" x 3" wheel, 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 15 HP, 4 Speed.
U. S. No. 62VS, 24", wheel, 2-7½ HP motor, variable speed.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

Horizontal Disc

GARDNER No. 124—53" wheel, 20 HP.
GARDNER No. 179, 70" dia. wheel, 40 HP.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 2450, & 3000 lbs. capacity.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Mixing Ladles, 2 & 3 ton. Electric & Manual Tilting.

MOLDING MACHINES

Jolt Squeezers

12—OSBORN No. 275-J—17x20 Table, 10".
2—OSBORN No. 216-PJ—21-32 Table, 16".
6—MILWAUKEE 123—17x26 Table, 12".
2—MILWAUKEE 181—24x36 Table, 18".
10—INT. PVJS—20x26 Table, 12" cyl.
9—SPO No. 110-J—17" x 20" Table, 10".
8—SPO No. 113-J—17" x 26" Table, 13".

Plain Jolt

1—J&J 50" x 72" table—5000# cap.
2—OSBORN 60" x 72" table, 6000# cap.
1—TABOR 36" x 36" table, 1000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—HERMAN 20" x 30"—750# series.
2—HERMAN 26" x 48"—1500# series.
2—HERMAN 50" x 60"—300# series.
2—HERMAN 40" x 48"—400# series.
1—HERMAN 60" x 84"— 6000# series.
1—HERMAN 60" x 84"—10,000# series.
14—INTERNATIONAL TYPE G., Size 20" x 8", 24" x 10", and 30" x 8".
1—J & J #920 RC—44" x 54"—Hyd. head.
2—J & J #612, 24" x 30" Table.
4— J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35" x 50"—2000#.
1—SPO No. 917-A—40" x 29" Table.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 508, table size 28" x 30".
1—SPO 5050, Table 25" x 30", 10" draw.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 42" table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT #34 AJS—36" x 48" Table.
3—INTERNATIONAL JDP 1600 x 10" draw, 36" x 36" Table.
2—INTERNATIONAL JDP 3000# x 10" Draw 48" x 48" table.
1—J & J #812—30" x 38" Table—10".
1—MILWAUKEE #2542—38" x 42" Table.
2—J & J No. 688 25" x 30" table, 6" draw.
2—MILWAUKEE No. 1030—30x38 Table.
1—MILWAUKEE No. 1536 32x38 Table.
3—MILWAUKEE No. 3548—44x48 Table.
1—SPO #3058, 22" x 28" table, 8" draw.
2—SPO #3070, Table 28" x 35", 10" draw.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE #165, 24" x 30" Table.
3—MILWAUKEE #196, 17" x 38" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
9—OSBORN 714PJ, 20" x 31" Tables.
1—OSBORN #818—24x36 Table, 18" cyl.
1—MILWAUKEE #246—23¼x42 Table.
4—INTERNATIONAL PKL, 17" x 26".
2—INTERNATIONAL #PK-16—20" x 30".
1—SPO #2136—21" x 30" Table—13" Cyl.
2—SPO 2114P, Table 21" x 27", 11" cyl.

Shell Molding

1—SHALCO, Model HO4, 2 station.

SANDSLINGERS

1—BEARDSLEY & PIPER Stationary Sandslinger, Model "DB." 5' jib arm, 4' ramming unit, 19" head, 4" cup, 2-speed motor 25 & 16 HP. Serial #676-5403. New 1955.
1—BEARDSLEY & PIPER Model "DB" Stationary Sandslinger 6' ramming unit, 10' jib arm, 19" head, 4" cup, 2-speed motor 40 & 20 HP W/raising & lowering arms. Serial #8-717-5701. New 1958.
1—BEARDSLEY & PIPER 5-ton Roto-Feed Plate Feeder. New 1958.

2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
6—B & P Tanks for speed slingers.
1—B & P Motive 15' Jib—6' Ram—19".
1—B & P Motive Jr. 8' Jib—4' Ram—19".

CONVEYORS

Steel Apron

9—JEFFREY & LINK-BELT 24", 30", 36" widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK-BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.
LINK-BELT "FLEXMOUNT"
1—8" W x 50' L x 4" deep pan.
2—18" W x 18' L x 4" deep pan.
2—SIMPLICITY 24" W x 13' L x 6" Deep.
1—SIMPLICITY 18" W x 11' L x 6" Deep.
1—SIMPLICITY 24' W x 19' x 6".

Roller

2500' MATHEWS 6", 14" wide, 2⅞" dia. roller, 1" hex shaft, 4" channel.
1500—MATHEWS 8" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold

1—DUO-ROLL 88 Cars 20" x 48", 350' track, with automatic dumping.
1—PALMER "B" 106 Cars—42" x 62" w/550' Track.

Belt

LINK-BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

HOPPERS & STORAGE BINS

2—NATIONAL ENGINEERING "Moulders Helper" 2 Hopper Unit.
7—NATIONAL & LINK-BELT Storage Bins, 60 to 150 tons cap.
1—NEWAYGO HB-7-GT, Handy Sandy.
42—MOLDERS Hoppers 1¼ ton cap.

SAND PREPARATORS

6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDB, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" Cutting Blade—1952.
2—MOULDERS' FRIEND 50" x 60" Brush.
2—NEWAYGO RR-V Reddy Sandys.
1—BEARDSLEY & PIPER #60.

SHAKEOUTS & SCREENS

2—LINK-BELT 5' x 10', 6 ton cap.
3—SIMPLICITY 4' x 6' Model B.
1—SIMPLICITY 4' x 8' Model D.
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8' Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#.
1—ROBBINS 6' x 10' JF11—20,000#.

SAND BLAST EQUIPMENT

2—AMERICAN 36" continuous Tumblasts.
1—AMERICAN 36" x 42", w/skip hoist.
2—AMERICAN 48" x 42", w/skip hoist.
1—AMERICAN 27" x 36", w/skip hoist.
1—AMERICAN 48" x 48", w/skip hoist.
1—AMERICAN 48" x 72" w/loader.
1—AMERICAN No. 2 Tablast—6' dia.
1—PANGBORN Model 6-GF, 6' diameter plain table with dust collector.
1—PANGBORN 6 LG-14 Multi-Table, 6-24" tables, w/dust collector.
1—PANGBORN Model 14GK-7 Roto-Blast barrel w/loader.
1—PANGBORN 9LG-14 Multi-Table w/6—36" dia. Aux. Tables w/Dust Collector.

AAA MACHINERY & EQUIPMENT CO.

10900 CEDAR ROAD—CLEVELAND 6, OHIO—CALL SW 1-3900

Two *OUTSTANDING VALUES* from UNIVERSAL

SAND HANDLING SYSTEM

NATIONAL ENGINEERING UNIT

Consisting of: No. 1½ Simpson U.D. Muller with water meter, National Screen Master Preparator, Skip bucket loaders, 20″ x 20′ belt conveyor, Bucket elevator, Sand storage bin, 5 Moulder's hoppers.
1957 unit in LIKE NEW CONDITION
Dismantled in our warehouse
Yours for Less than Half of today's replacement value!

BEARDSLEY & PIPER—2 Speed

MOTIVE JR. SANDSLINGER

Complete with spare parts.
4″ tip, 19″ head, 11′ jib arm, 4′ ram arm.
7 to 10 cu. ft. per minute ramming capacity, 3′ track gauge, 200 cu. ft. tank capacity.

Located in our warehouse.
PRICED EXCEPTIONALLY LOW!
Write or Phone for Inspection.

PARTIAL LISTING OF OUR REGULAR REBUILT MACHINERY STOCK

AIR COMPRESSORS
1—75 hp INGERSOLL-RAND water cooled, horizontal
1—100 hp WORTHINGTON air cooled, 2 stage

BLOWERS
25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM - GREEN, FISHER Positive Pressure & Cent, Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS
1—15″ Cont. WHEELABRATOR Tumblast
1—26″ Cont. WHEELABRATOR Tumblast
1—15″ x 20″ WHEELABRATOR Tumblast
1—20″ x 27″ WHEELABRATOR Tumblast
1—27″ x 36″ WHEELABRATOR Tumblast
1—36″ x 42″ WHEELABRATOR Tumblast
1—48″ x 42″ WHEELABRATOR Tumblast
1—48″ x 48″ WHEELABRATOR Tumblast
1—48″ WHEELABRATOR Swing Table
1—1-A WHEELABRATOR Multi-table
1—WHEELABRATOR Peening Cabinet
1—PANGBORN TABLAST, 8′ Table
1—PANGBORN Air Blast Room
1—PANGBORN PIPE CLEANING CABINET
1—SLY, 68″ x 32″ Round
4—SLY, 48″ x 36″ Round

CONVEYORS
1—HEWITT-ROBINS Oscillating, 18″ W x 40′ L
1—HEWITT-ROBBINS Vibrating, 18″ W x 10′ L, Model VC-I
1—LINK-BELT Bucket Elevator, 8″ x 12″ buckets on 14″ rubber belt, completely enclosed by 2′ x 4″ casing.
1—LINK-BELT, CAR type mold, 114 cars, 403′ track, car size 18″ x 42″
1—SIMPLICITY, 24″ x 10″ Feeder w/hopper, Model OA-10-JA2

CORE BLOWERS
10—DEMMLER #1, #2, #2A, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A," Bench Type
1—SAN-BLO #40-P-1, 40# core
1—TACCONE #4D, 10″ Draw Stroke Cyl.

DUST COLLECTORS
COMPLETE STOCK—both Wet & Bag Types

FURNACES—DIRECT ARC MELTING
1—11′ LECTROMELT Top Charge
1—250 lb. LECTROMELT, Side Charge
1—500 lb. LECTROMELT, 200 KVA trans.
1—1000 lb. SWINDELL
1—2000 lb. HEROULT
1—2000 lb. SWINDELL, 3/60 1000 KVA.
1—1½ Ton HEROULT
1—12′ SWINDELL Hyd. Top Charge

FURNACES—INDIRECT ARC
1—10# DETROIT
1—350# DETROIT LFA
1—750# DETROIT LPY, Conical Shell
1—1000# DETROIT AAD P, 300 KVA
1—3000# DETROIT C, 500 KVA

FURNACES—INDUCTION MELTING & HEATING
1—30 KW ECCO Hi-freq. Vacuum Melting
1—35 KVA AJAX 60 cy., alum.
1—35 KVA, AJAX SPARK GAP, High Freq., steel
1—1250 KW 2 Ton Cap.
1—30 KW LEPEL, water cooled spark gap

FURNACES—GAS & OIL
1—1000# HAUSFELD hand tilt, Oil fired, alum or magnesium
1—1 #900 JC STROMAN, gas. Like new
1—6000# STROMAN, gas Fired

FURNACES—HEAT TREAT
1—4′ x 4′ x 10′ Gas Fired Annealing
1—9′ x 12′ Car Type, gas/oil
1—210 KW LINDBERG conveyor box type
1—7′ Rotary G.E., 200 KW, 1950° F
1—36″ x 36″ WESTINGHOUSE Pit Type.

MOLDING MACHINES
Jolt Rollover Pattern Draw

MILWAUKEE Jolt Squeeze Rollover Pattern Draw Model 217, 35″ x 41″ flask, 12″ draw, 24000# squeeze capacity.

2—DAVENPORT #34SA w/air clamps, 34″ x 48″ table, 2500#
2—DAVENPORT #40SA, 40″ x 60″ table, 3000#
1—HERMAN 10,000#, 48″ x 109″ table
1—HERMAN 6000#, 42″ x 78″
2—HERMAN 7500#, 40″ x 50″ tables
1—HERMAN 7500#, 40″ x 60″ table
1—HERMAN 3000#, 30″ x 66″ table
1—HERMAN 3000#, 32″ x 70″, 15″ cyl. series charging conveyor type
5—HERMAN 1500# to 30″ x 48″ tables
3—HERMAN 750#, 24″ x 30″ tables
1—INTERNATIONAL 30″ x 12″, Type G, 28″ x 35″ table
2—INTERNATIONAL, 13″ x 17″ tables
1—OSBORN #602, 36″ x 26″, 900#
1—OSBORN #405, 3000#, flask 64″ x 57″
4—TABOR 40″ x 60″, 1500 & 3000#
2—TABOR 30″ x 40″ w/air clamps, 1000#
1—TABOR 22″ x 42″, pattern draw, shockless, portable, 600#
1—TABOR 20″ x 30″, w/air clamps, 1000#
2—TABOR 14″ x 16″ Rockover 150#
1—TABOR 40″ x 50″ table, 3000# capacity

Plain Jolt
1—INTERNATIONAL, 3′ x 4′ table, 12″ cylinder

Jolt Pin Lift
1—HERMAN #4317, 22″ x 30″ table
2—INTERNATIONAL JDP, 1200 x 8″, 24″ x 26″ table, 8″ draw, 1200#, port.
1—OSBORN #559, 25″ x 30″ table, 6″ draw, 1200#
2—SPO #305, 750 lb., 20″ x 27″ table
1—TABOR 20″ x 24″ table, 600#

Jolt Squeeze Pin Lift
2—INTERNATIONAL PKL, 20″ x 28″ table, 14″ sq. 5½″ draw
2—INTERNATIONAL PKL, 18″ x 24″ table, 12″ sq., 5½″ draw, stat.
2—MILWAUKEE #163, 15″ x 24″ table, 11″ sq., 1500#
1—NICHOLLS 18-44, 6½″ draw.
5—OSBORN #712J, #712PJ, 18″ x 28″ table, 12″ sq., 6″ draw, stat. & port.
5—SPO #2114P, 21″ x 27″ table, 600#
2—SPO #2116, 21″ x 27″ table, 11″ sq., 6″ draw

Jolt Squeezers
2—INTERNATIONAL #12 LJS, 16″ x 20″
4—INTERNATIONAL #10 LJS, 16″ x 20″
10—OSBORN #275J, 16 x 20″ table, 400#
2—OSBORN #716PJ, 22″ x 34″ table, 16″ sq., 8″ draw
3—TABOR Squeeze-in Head, 16″ x 19″ table

MATERIALS HANDLING
1—BYERS, Mobile Crane, BUDA Engine, 50′ Boom, 5 ton w/magnet & bucket
1—HOUGH PAYLOADER, Model HA, 1000# cap., hyd. lift, mech. dump

MULLERS AND MIXERS
1—B&P #30 Speedmuller w/skip, 3 cu. ft.
1—B&P #40 Speedmuller w/skip, 5 cu. ft.
1—B&P #50 Speedmuller with cooling & multro-matic controls, 7½ cu. ft.
1—B & P, Conventional, SIMPSON type, 87½″ Dia. arranged for cooling
1—CLEARFIELD #404, 4′ Dia, 4 cu ft
1—SIMPSON #0, U.D., 3′ Dia
1—SIMPSON #1, U.D., 4′ dia., 4 cu. ft.
1—SIMPSON #2, 6′, enc. gear, Dia. 14 cu. ft.
2—SIMPSON #3, enc. gear, 20-25 cu. ft.
1—SIMPSON #3, 8′ Dia. Open Gear, 20-25 cu ft batch

LADLES
Bottom Pour
4—MODERN, 49″ x 49″
2—MODERN Crane Type, 55″ H x 50″ top
1—MODERN Crane Type, 60″ H x 60″ top

Lip Pour
1—WHITING 52″ x 52″ top dia. geared

Cylindrical
8—WHITING, 26″ L x 25″ dia, 1100# iron
7—WHITING, 19″ L x 22″ dia, 600# iron
3—WHITING, 38″ L x 28″ dia, 2200# iron

OVENS
1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22″ x 12′ x 10′
3—GENRICH, Elec. elevator type, Inspection under operation in N.Y.C.—Excellent Condition
1—LANLY, elec. centrifugal drier, 5′11″ x 3′2″ x 7′3″ H

SAND CONDITIONING
1—AMERICAN Sand Cutter, Model AA, 62″ cutting reel
1—B & P Nite-Gang
2—B&P Screenarator, Model "M"
1—LINK-BELT Revivifier
1—MOULDER'S FRIEND, 50″ cutting reel
1—ROYER Jr., 7-10 tons/hr., ½ Hp
2—ROYER, NC-2, 10-15 tons/hr, 1½ HP
1—ROYER NC-4, 10-15 tons/hr. 1½ Hp
1—ROYER PREPARATOR, Comb. Model NDC, 25 ton/hr scrap removal, 8′ x 8′ hopper
3—ROYERS, NDP, 15-25 tons/hr, 2 Hp
1—SIMPLICITY Type SOBG, 4′ x 5′ screen
6—SIMPLICITY Shakeouts, 3′x10′, 4′x8′, 4′x10′, 5′x8′

SAND SLINGERS
1—B&P Stationary, 2 speed, 19″ head, 4″ tip with plate feeder
1—B&P Stationary, Single Speed
2—B&P Tractor Type, 16″ head
1—B & P Tractor Type 19″ head

MISCELLANEOUS
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1—KANE & ROACH WIRE STRAIGHTENER Model DX-5
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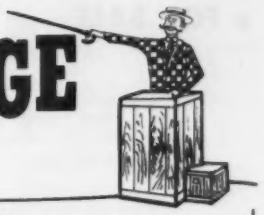

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SPENCER 1350 cfm, 32 oz.
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NORTH AMERICAN 850 cfm.
McKee 200 cfm.

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17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives. 2 hp., 220-440 V.
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DEMMLER #55
DEMMLER 2EO
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INTERNATIONAL SB 13, up to 60# cores
6—OSBORN 193 up to 50# cores
REDFORD #2 & #4

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5—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS
THERMONIC INDUCTION MODEL 1800A
3—Despatch ET. Drawer Type

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw
SUTTER #500

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GARDNER 26" D.E. Disc.
GARDNER 30" D.E. Disc.
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53" Hanchett Horizontal Disc.

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120A GARDNER 30" Opposed Disc
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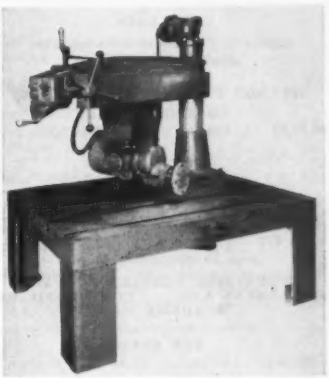
2—US 30" x 3 25 HP. DE Snag
STANDARD 24 x 2½—15 HP DE Snag



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1—500# INGERSOLL-RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers
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4—2000# Ingersoll Rand Hoists

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4000# Industrial, Insulated

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TACCONE TD4 24" x 32" flask

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JOLT SQUEEZE PIN LIFT
8—OSBORN 712 PJ 18" x 28" table
1—CHAMPION JSL10P 18" x 21" table 6" draw
8—MILWAUKEE 2646 Jolt Squeeze Strip rolloff — rolling molding machines 10" jolt cylinder; 1800# capacity, 26" Squeeze cylinder; 13" draw, Flask size 25½" to 29" wide, 52" long. FACTORY REBUILT.
2—MILWAUKEE 165, 24" x 30", 8" draw

JOLT SQUEEZERS
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ
2—MILWAUKEE 244 Jolt Squeeze car type head
MILWAUKEE 181-7, 24" x 36" table
104 MILWAUKEE 10"—32 Adams
113 PJ SPO
25—124 MILWAUKEE Portable Jolt Squeezer
6—104 MILWAUKEE Portable Jolt Squeezer

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HERMAN 10000# late
HERMAN 3000#
2—750# HERMAN 20" x 30" table
1—INTERNATIONAL RJ 20" x 12"
1—SPO 9032
3—SPO 506
1—SPO 506
2—INTERNATIONAL G
2—TABOR 30 x 52

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OSBORN 331-332-333
SPO 413D
INTERNATIONAL RES.

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40" x 84" Herman
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2—#3 UD Simpson
1—930 Clearfield
CLEARFIELD #404
4—#2 SIMPSON OG
#1 Simpson OG

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150 ton HPM
150 ton Farquhar "C" Frame
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60 ton Lempco 4 post
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COLEMAN 55 Spectrophotometer
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TINIUS OLSON Brinnel Hardness Tester Production Bench

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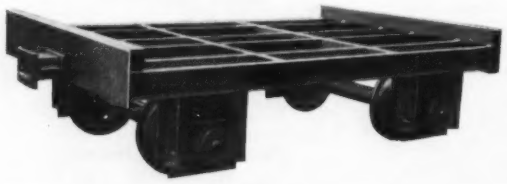

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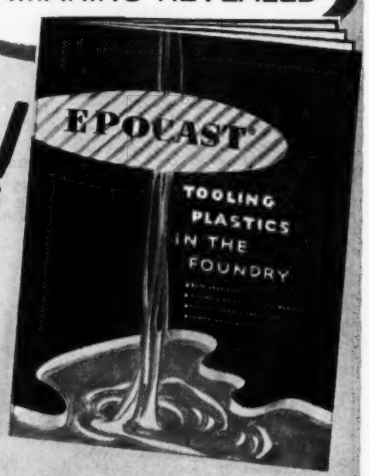

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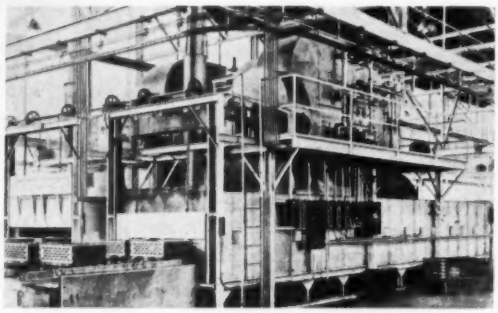

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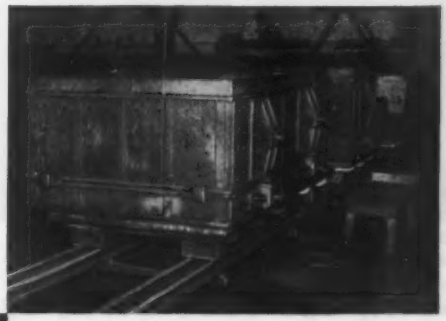
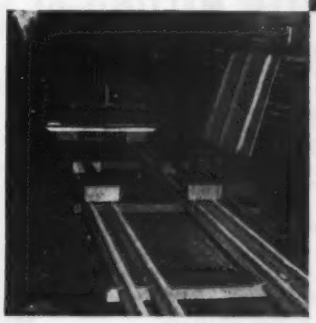
These 10,000 lb. molds can be moved by a man — without straining — without using overhead cranes! Metal is poured directly into molds while on the conveyor without any possibility of damage from spilled metal. Molds ride over double sets of 30# ASCE Railroad-type steel rails from molding through pouring to shakeout — a distance of 72 feet.



A SPECIAL FEATURE of this NOMAD CONVEYOR is the use of 6000 lb. cap. dollies. Molds on 47″ x 54″ bottom boards form a bridge between dollies and double rails.



NOMAD CONVEYORS FEATURE FLEXIBILITY!

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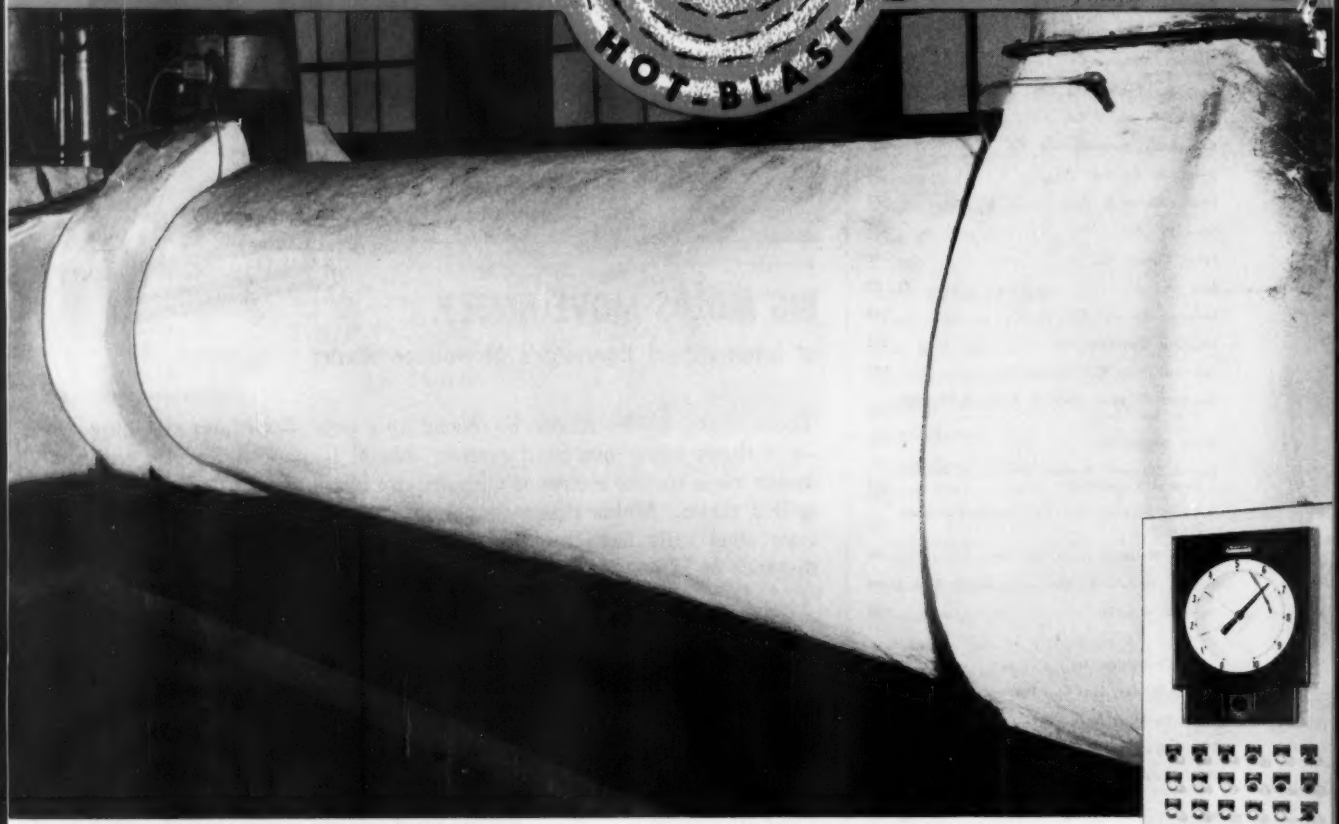

MODERN, externally fired, tube-type, recirculatory, cupola air heater. MODERN valves control air flow to cupola and to relief. All cupola and heater operations are controlled from central station.

750°F., and 5000 SCFM, SPEED MELTING of MALLEABLE . . .

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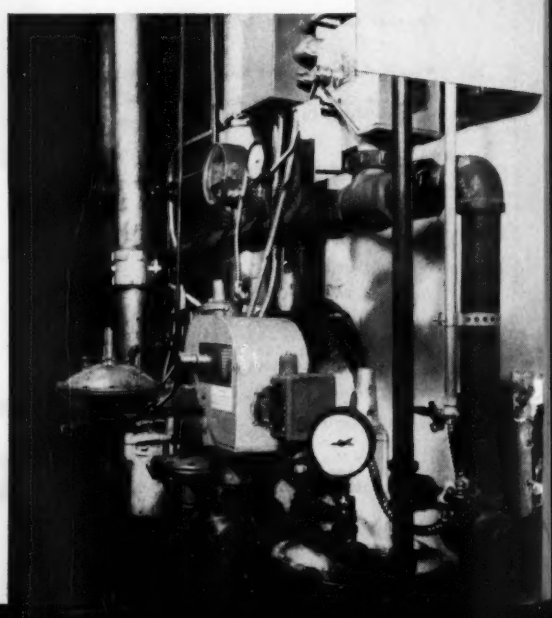
- *Decreased refractory cost . . .*
- *Uniform metal temperatures . . .*
- *Hotter iron is tapped . . .*
- *Bridging is eliminated . . .*
- *Fewer castings scrapped . . .*
- *Lower sulfur pick-up . . .*
- *Increased melting efficiency . . .*
- *Less costly charge substitute . . .*
- *Chemistry is more uniform . . .*
- *Melting rates increased . . .*



Since all hot-blast operations incur their own, peculiar requirements we welcome every opportunity to plan with you, early, in your pre-planning stages . . .

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- *Fast efficient batch mixing*
- *Easiest loading and unloading*

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IT'S FAST—thoroughly mixes a uniform batch in less than two minutes.

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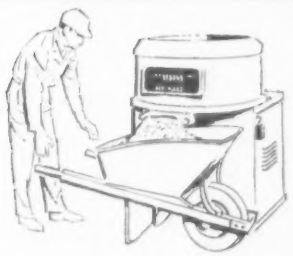
IT'S VERSATILE—provides superior performance with all types of binders.



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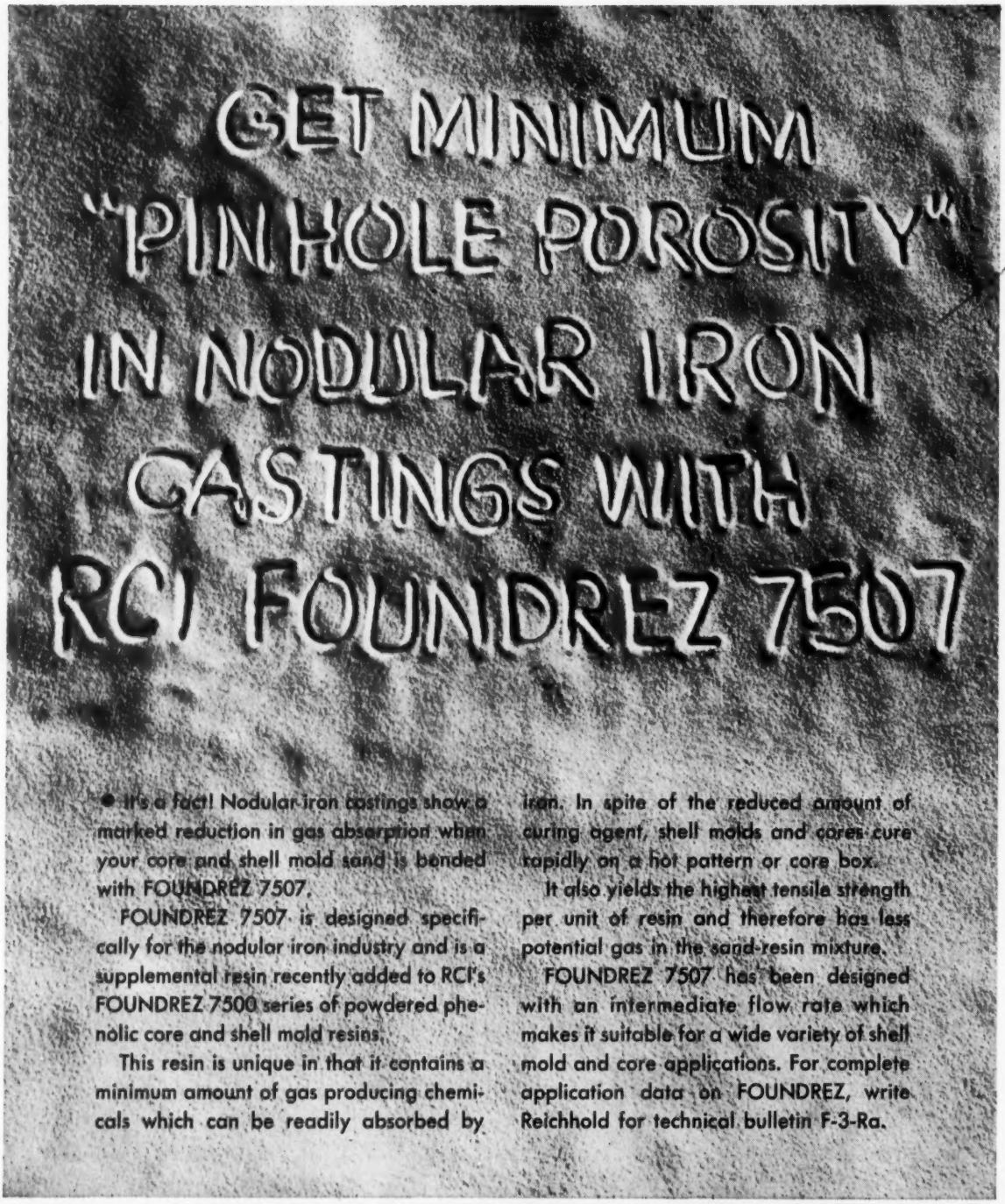

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FOUNDREZ 7507 is designed specifically for the nodular iron industry and is a supplemental resin recently added to RCI's FOUNDREZ 7500 series of powdered phenolic core and shell mold resins.

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FOUNDREZ 7507 has been designed with an intermediate flow rate which makes it suitable for a wide variety of shell mold and core applications. For complete application data on FOUNDREZ, write Reichhold for technical bulletin F-3-Ra.

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